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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

ISSUED WEEKLY BY THE AMERICAN MACHINIST PRESS,

Vol. 22. 218 WILLIAM STREET, NEW YORK. No. 47.

Contents and Index to Advertisers, Page 12

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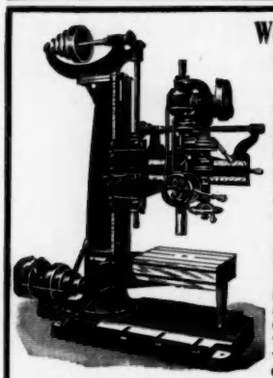

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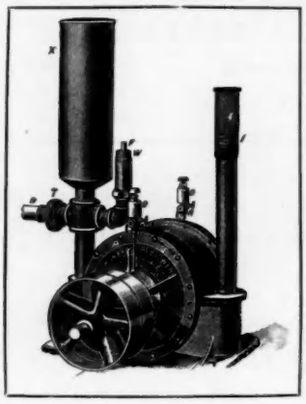

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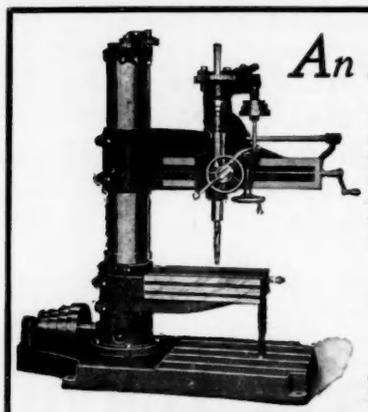

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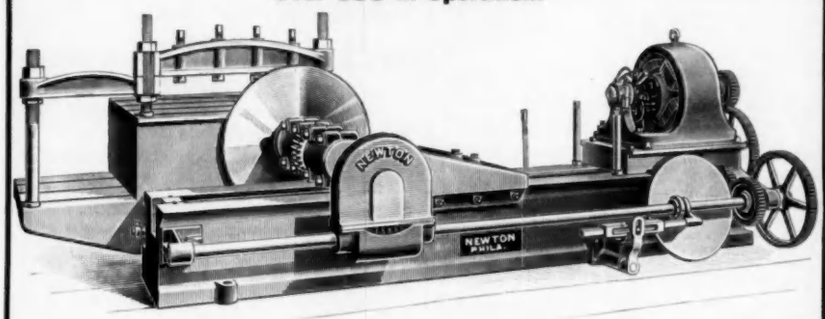

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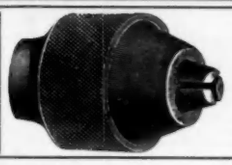

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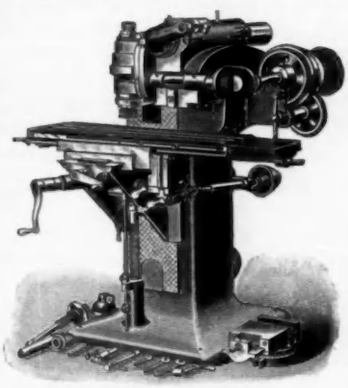

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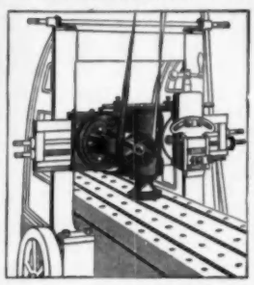

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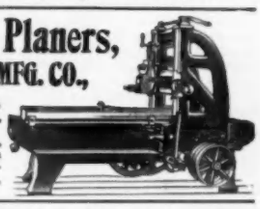

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Index to Advertisers.

PAGE

Acme Machinery Co. 16
Adams Co., The 11
Albro-Clem Elevator Co. 6
Almond, T. R. 11
Alteneder & Sons, Theo. 55
American Gas Furnace Co. 2
American Machinery Co. 53
American Saw Co. 10
American Tool & Machine Co. 2
American Tool Works Co. 46
Armstrong Bros. Tool Co. 3
Arthur Co., The 8

Backus Water Motor Co. 52
Baird Machinery Co., U., 2, 3, 6, 7, 8, 11, 41, 43, 47, 48, 52, 53
Baird & Co., Henry Carey 11
Baker Brothers 48
Baldwin, Davidson & Wight 11
Ball Bearing Co. 16
Barker & Chard Mach. Tool Co. 49
Barnes & Co., W. F. & John 53
Beaman & Smith 41
Becker-Brainard Milling Mach. Co. 42
Bement, Miles & Co. 10
Berlin Iron Bridge Co. 50
Besly & Co., Chas. 56
Bethlehem Foundry & Machine Co. 8
Bethlehem Steel Co. 55
Bickford Drill & Tool Co. 2
Bilgram, Hugo 9
Blaisdell & Co., P. 52
Bliss Co., E. W. 6
Boston Gear Works 55
Bradford Mill Co., The 52
Bristol Co. 56
Brown Hoisting & Conveying Mach. Co. 55
Brown & Co., R. H. 9
Brown & Sharpe Mfg. Co. 56
Brown & Zortman Machinery Co. 44
Buffalo Forge Co. 56
Bullard Machine Tool Co. 3
Bullock Electric Mfg. Co. 49 and 53
Burt Mfg. Co. 39

Caldwell Co., W. E. 54
Carborundum Co., The 41
Card Mfg. Co., S. W. 7
Cataract Tool & Optical Co. 16
C & C Electric Co. 51
Chambersburg Engineering Co. 54
Chapman & Co., J. B. 4
Cincinnati Mach. Tool Co. 48
Cincinnati Milling Machine Co. 47
Cincinnati Planer Co. 6
Cincinnati Radial Drill Co. 5
Cincinnati Shaper Co. 16
Clark, Jr., & Co., Jas. R. 7
Clark Thread Co. 15
Clement & Clement, Ltd. 41
Cleveland Ball & Screw Co. 48
Cleveland Gear Works 39
Cleveland Twist Drill Co. 56
Cleveland Stone Co. 55
Climax Road Machine Co. 15
Clough, R. M. 52
Columbus Machine Co. 54
Cook Co., Asa S. 9
Cornell Machine Co. 54
Crescent Steel Co. 7
Crosby Steam Gage & Valve Co. 7
Cumberland Iron & Steel Shafting Co. 7
Curtis & Co., Mfg. Co. 52
Curtis & Curtis 4
Cushman Chuck Co. 9

Dallett & Co., Thomas H. 43
Danielson Machine & Tool Co. 15
Davis Machine Co., W. P. 16
Dayton Globe Iron Works Co. 54
Detrick & Harvey Machine Co. 53
Detroit Lubricator Co. 54
Diamond Mach. Co. 4
Dixon Crucible Co., Joseph 49
Doan & Co., J. B. 14
Draper Machine Tool Co. 44
Dreses, Mueller & Co. 52

Eames Co., G. T. 51
Eddy Electric Mfg. Co. 11
Electrical Engineer Institute 9
Engineering Agency 39
Errington, F. A. 9

Falkenau, A. 50
Faneuil Watch Tool Co. 56
Farrel Foundry & Machine Co. 44
Fellows Gear Shaper Co. 10
Fifield Tool Co. 56
Flather & Co. 16
Foos Gas Engine Co. 54
Foote, Burt & Co. 3
Fosdick & Holloway Mach. Tool Co. 2
Frick Co. 54

Garvin Machine Co., The 15
General Electric Co., The 55
Geometric Drill Co. 50
Gisholt Machine Co. 3
Gleason Tool Co. 56
Goodell-Pratt Co. 3
Goodyear, S. W. 4
Gould & Eberhardt 16
Grant Gear Works 16
Grant Machine Tool Works 7
Grant Mfg. Co. 47
Gray Co., G. A. 16

PAGE

Hamilton Machine Tool Co. 55
Hammacher, Schlemmer & Co. 40
Hampden Corundum Wheel Co. 4
Hartford Steam Boiler Insp. & Ins. Co. 11
Henderer's Sons, A. L. 6
Hendey Mach. Co. 13
Hill, Clarke & Co. 14
Hilles & Jones Co. 3
Hoefer Mfg. Co. 4
Hoggson & Pettis Mfg. Co. 9
Hoppes Mfg. Co. 41
Horsburgh & Scott 56
Horton & Son Co., E. 9
Hurtbut-Rogers Machine Co. 9
Hyatt Roller Bearing Co. 2

Ingersoll-Sergeant Drill Co. 49
International Correspondence Schools 49

Jenkins Brothers 40
Jones & Lamson Machine Co. 1 and 16

Kelly Machine Co., R. A. 45
Kempsmith Machine Tool Co. 4
Keuffel & Esser Co. 8
Kolbe, Robt. 55

Landis Tool Co. 6
Le Blond Machine Tool Co., R. K. 56
Le Count, Wm. G. 9
Leighton & Wisner 7
Leland & Faulconer Mfg. Co. 4
Lodge & Shipley Machine Tool Co. 5
Long & Allstatter Co. 46
Lunkenheimer Co., The 54

McCabe, J. J. 14 and 49
Mackey Co., Ltd., The 11
Mackay, James T. 14
Marshall & Huschart Mach. Co. 14
Mietz & Weiss 54
Mitts & Merrill 6
Morse Twist Drill & Mach. Co. 15
Morse, Williams & Co. 6
Morton Mfg. Co. 55
Moseley Lathe Co. 16
Mossberg & Granville Mfg. Co. 15

National Elastic Nut Co. 48
Newark Machine Tool Works 16
New Era Iron Works 54
New Haven Mfg. Co. 10
New Jersey Machine Works 9
New Process Twist Drill Co. 7
Newton Machine Tool Works, Inc. 11
Nicholson File Co. 40
Nicholson & Co., W. H. 8
Niles Tool Works Co., Hamilton 47
Niles Tool Works Co., New York 14
Northern Engineering Works 40
Norton Emery Wheel Co. 49
Norwood Bicycle Co. 41

Oesterlein Machine Co., The 16

Palmer Bros. 54
Pearson Machine Co. 4
Philadelphia Book Co. 2
Pond Machine Tool Co. 51
Pond Machine Co., L. W. 43
Poole & Son Co., Robt. 8
Potter & Johnston Co. 8
Pratt Chuck Co. 9
Pratt & Whitney Co. 43
Prentice Bros. Co. 48
Prentiss Tool & Supply Co. 14
Putnam Machine Works 16

Q & C Co. 10
Quint, A. D. 47

Reeves Pulley Co. 49
Rogers Boat, Gage & Drill Works, John 53
Rudolphi & Krummel 43
Rue Mfg. Co. 54

Sackmann, F. A. 7
Safety Emery Wheel Co. 9
Saunders' Sons, D. 41
Sawyer Tool Co. 5
Sebastian Lathe Co. 43
Sellers & Co., Inc., William 16
Seneca Falls Mfg. Co. 4
Shonberg, I. 6
Shultz Belting Co. 16
Sibley & Ware 49
Silk, Anderson Co. 55
Skinner Chuck Co. 9
Slocomb & Co., J. T. 15
Smith & Mills 3
Spencer Auto. Mach. Screw Co. 7
Springfield Foundry Co. 6
Springfield Gas Engine Co. 54
Standard Tool Co. 43
Starrett Co., L. S. 10
Steel Ball Co. 7
St. Louis Machine Tool Co. 53
Stuart's Foundry & Machine Works, R. J. 56
Tabor Mfg. Co. 49
Tight Joint Co. 8
Toomey, Frank 14
Trump Brothers' Machine Co. 9
Turner, Vaughn & Taylor Co. 55
Vitrified Wheel Co. 11
Waltham Watch Tool Co. 11
Warner & Swasey 56
Watson-Stillman Co., The 5
Weber Gas & Gasoline Engine Co. 54
Webster Mfg. Co. 54
Webster & Perks Tool Co. 4
Wells Bros. & Co. 56
Westcott Chuck Co. 9
Western Mfg. Co. 47

PAGE

Whitcomb Mfg. Co. 11
Whitney, Baxter D. 2
Whitney Mfg. Co. 51
Whiton Machine Co., D. E. 9
Wiley & Russell Mfg. Co. 40
Wiley & Sons, John 40
Williams & Co., J. H. 41
Windsor Machine Co. 8
Winkley, F. D. 16
Wood's Sons, T. B. 53
Woodward & Powell Planer Co. 40
Woodward & Rogers 52
Worcester Machine Screw Co. 52
Wyman & Gordon 56

York Co., S. M. 14
Young Mfg. Co., W. C. 49

Contents.

PAGE

Shops Not Arcadias. 17
Incompleteness of Government Statistics. 17
Machinery Exports for September. 18
The Voting Machine Again. 18
Commercial Review. 19
Recent French Engineering. By W. H. Booth. 21
The Limiting Size of a Twist Drill. 21
A Shaper with a New Automatic Down Feed. 23
Sacrifice to the Engine God. 23
A New Lubricant Composition. 24
Making Revolving Crane Beds—II. By Joseph Horner. 25
An Endshaking Tool. By A. H. Cleaves. 26
Phosphor Bronze Lathe Centers—Tool Room Practice. 28
An Exhibit of American Machinery in Yokohama. 28
Letters from Practical Men: Engines of Torpedo Boats. By A. H. Nourse....The Deceptive Fracture of Pig Iron. By Thomas D. West....Rig for Turning Piston Rings. By Peter Schellenbach....Machine Shop Notes. By J. B. Hall. English Pipe Threads—Habits of English Workmen—English Co-operative Societies. By Jas. Vose...Corresponding Curves for Draftsman and Pattern Maker. By J. I. Blount....A Combination Die. By H. E. Harris....Boring an Eighteen-Foot Propeller Wheel in a Fifty-six-Inch Lathe. By H. S. Brown....Approximate Construction of an Ellipse. By F. O. Hunt....Holding Wires for Cutting Off—Card Index for Customers' Patterns. By S....An Improvised Upsetting Rig. By R. Bettermann...The Secor Oil Engine. By Herbert L. Towle and John A. Secor. 29-37
Die Making—Blanking and Drawing Tools. 37
Annual Meeting of the American Society of Mechanical Engineers—Programme of the Meeting. 37
Meeting of the Society of Naval Architects and Marine Engineers. 37
Personal. 38
Death of W. F. Durfee. 38
Obituary. 39
Bicycle Factories Closed. 40

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Shops Not Arcadias.

It is to be feared that some of our English friends will not acquire a very accurate idea of American shop life from reading some of the articles that are being printed by our own American as well as by British technical journals on the subject of what is known as "American Competition."

If one were to judge solely by these articles, he might easily conclude that all American machine shops are simply little terrestial heavens, so to speak—that the proprietors, with one accord and willingly, pay each man all he is worth and treat him with the utmost consideration, while the men themselves are all high-minded geniuses, each bent upon inventing some new improvement every day to facilitate his work; all anxious to run as many machines as possible, and each machine always to its utmost capacity.

Now, the fact is, as we all know, that, here as elsewhere, there are shops and shops; and men and men. In a few of our shops something of the conditions outlined are approached, but in most of them they are by no means approached. Plenty of shops can be found here in which the men do no more than they think they are obliged to do, and in which they almost never dream of making suggestions for improvements. Usually the same shops will be found to be under the direction of proprietors or superintendents whose only idea is to hire men as cheaply as possible, give them as few facilities and comforts as possible and drive them to the utmost limit.

There are plenty, and too many, American shops which are in charge of foulmouthed, abusive and tyrannical brutes, for whom no self-respecting man will work at all unless he is so unfortunate as to be unable to get work elsewhere, and these shops are, as a matter of course, those in which much is heard of the unreliability and general imbecility of the "average man."

The shops in which the relations of employer and employee are quite all that could be desired on either side are exceptional, though it is probable, of course, that there is less friction and less cause for dissatisfaction here than elsewhere. It is not to be inferred that American machine shop men all dwell in Arcadia; most of them have their troubles here as well as elsewhere, and much of this trouble is caused by lack of consideration on both sides and by what, for want of a better term, is sometimes called mulishness.

Our foreign friends, when they visit us, naturally see our best shops, and when they or American writers speak of our shops they naturally have in mind our best ones only. But we have all kinds of shops here—some that we will guarantee are operated upon as narrow-minded and unprogressive principles as are to be found anywhere else in the world.

Plenty of American shops can be found in which the proprietors or superintendents have difficulty in getting things to go as they should without arousing active opposition by the men, and on the other hand there are plenty of shops in which the men or the foremen must waste lots of energy and nerve force in "managing" ignorant and cranky employers, who can never be made to do what is for their own best interest, except by being wheedled or led into it by someone else.

Incompleteness of Government Statistics.

The Bureau of Statistics, United States Treasury Department, publishes monthly a summary of the country's commerce and finance, containing a classified statement of the exports of a great variety of articles of merchandise, including several kinds of machinery under distinct captions. Metal working machinery, electrical machinery and some others were taken out of the general class in July, 1897, and placed among the separately specified goods. We have long been publishing monthly, in condensed and rearranged form, such part of these statistics as were likely to be of especial interest to our readers. We have, however, on at least one occasion repeated a criticism made in regard to the metal working machinery totals, that they are small as compared with the amounts which even an offhand estimate shows that the American machine tool builders must be exporting. The official valuation given for metal working machinery shipped abroad during the fiscal year ending June 30, 1899, was $6,491,585, an average of $540,965 per month. Latterly, the individual monthly totals have indeed sometimes exceeded $600,000. But a single foreign dealer is understood to be importing American tools of a monthly value one-fourth or one-third as great as that sum. Brief reports published frequently in the "American Machinist" show how this or that machine tool manufacturer, East or West, has been devoting "one-fourth," "one-third," "one-half," "two-thirds," or "nearly all" his product to the foreign market, a state of affairs which many of our readers can confirm from their own experience and observation. If anyone conversant with the subject will note upon the advertising index of the "American Machinist" the many concerns which are known to be doing a good foreign business and of the several who are known to have a very large export trade, the inaccuracy of the official estimate will, we think, be apparent. That these governmental statistics are, as we have suspected, grossly incomplete seems to be admitted in the following communication from the acting chief of the Bureau of Statistics, a letter written to "Peck's Buyers' Index," of this city, in reply to a suggestion of Mr. W. J.

Davis, manager of that publication, that the bureau should enter into greater detail in its classification of goods exported:

TREASURY DEPARTMENT, BUREAU OF STATISTICS.

WASHINGTON, D. C., Sept. 21, 1899.

"Peck's Buyers' Index," 100 William street, New York city, N. Y.:

Sirs—I am in receipt of your valued favor of the 14th inst. While this bureau is in accord with you in respect to the desirability of extending some of the groups and classes of our domestic export schedule, there are difficulties in the way of our doing so, among which are the following:

1. Each article added to the classification increases the clerical work of compilation, etc., and the bureau force is already fully occupied with the present amount of work.

2. The proper details are difficult to obtain from exporters, especially in respect to highly manufactured goods. Some of the exporters who are building up an export trade in certain articles desire as little publicity in regard to it as possible, and therefore, they manifest the articles which they export under some general heading, such as "Chemicals," "Manufactures of Iron and Steel," "Manufactures of Wood," etc. Exporters of merchandise on through bills of lading from interior parts in many cases do not furnish the steamship agent at the seaboard with lists of the goods exported. The agent, therefore, is obliged to obtain his description of the articles from the bills of lading, which are only sufficiently definite to identify the goods and the collection of freight. They are very defective in supplying statistical information.

There being no inspection of exports on the part of the government, the custom house is obliged to accept manifests which formally comply with the export law. It is only in case of goods which are manifested by number, weight and measure, as well as by value, that criticism is practical.

The increased detail and accuracy of the export schedule is not a matter of funds, but of law, and it is questionable whether the minute detail which you desire could be obtained without the authority of Congress to inspect exports. It is doubtful that Congress would grant this authority.

It is suggested to you to call at the Bureau of Statistics in the Custom House at your port and consult with the head of that bureau, who will explain to you the difficulties which surround the subject in the present condition of the law. Our greatest obstacle to the extension of classes is the large and ever-growing exportation of manufactured goods from interior parts to foreign countries on through bills of lading. It is hoped that the present law may be so amended as to require the interior shipper to forward with his goods a list thereof for the information of the custom houses through which they are cleared on the border or seaport. After you have consulted with the chief of the Bureau of Statistics at your Custom House, you might write us further upon this subject. We should be very much gratified to receive your suggestions and assistance in this matter. We are fully alive to the importance of keeping up with the growth of our export trade in the accuracy and useful information offered by our statements.

J. N. WHITNEY,
Acting Chief of Bureau.

It appears, therefore, not to be the fault of the Bureau of Statistics if its reports are incomplete. If any manufacturer is anxious for a greater accuracy or minuteness of detail he can help along the result in two ways: by exerting his influence to get a law passed requiring the labeling of merchandise in definite terms, and by thus marking his own goods, in order that his contribution, at least, to the total of its appropriate class shall not be lacking.

Machinery Exports for September.

The "Monthly Summary of Commerce and Finance" shows for September, 1899, exports of metal-working machinery amounting to $500,043, as against $539,122 for September, 1898, which would indicate that the maximum demand for machine tools has been passed, only these figures for so short a time do not constitute a sufficient criterion to establish such a fact. For August, 1899, we have already reported metal-working machinery export shipments at $635,549. For the year 1899 up to and including September, the total is $4,995,708, against $4,091,232 for the corresponding portion of 1898.

Electrical machinery exports were: September, 1899, $262,689; September, 1898, $212,913; August, 1899, $230,009; year 1899 to October 1, $2,090,737; year 1898 to October 1, $1,652,656.

Printing presses and parts thereof: September, 1899, $52,843; September, 1898, $67,502; August, 1899, $78,945; year 1899 to October 1, $650,737; year 1898 to October 1, $596,257.

Pumps and pumping machinery: September, 1899, $239,512; September, 1898, $187,252; August, 1899, $326,360; year 1899 to October 1, $2,290,711; year 1898 to October 1, $1,615,281.

Locomotive engines: September, 1899, 40 in number, at $355,660 in aggregate value; September, 1898, 46, at $492,776; August, 1899, 107, at $1,412,432; year 1899 to October 1, 406, at $3,992,452; year 1898 to October 1, 470, at $4,337,693; year 1897 to October 1, 259, at $2,319,428.

Stationary engines: September, 1899, 95, at $49,363 aggregate value; September, 1898, 36, at $20,380; August, 1899, 109, at $60,620; year 1899 to October 1, 642, at $353,470; year 1898 to October 1, 394, at $278,654.

Boilers and parts of engines: September, 1899, $110,025; September, 1898, $153,228; August, 1899, $243,518; year 1899 to October 1, $1,017,161; year 1898 to October 1, $902,291.

Some of our friends in France have objected to our comments on the "La Bourgogne" disaster, and one of them now alludes to the behavior of the "Scotsman's" crew, and asks us if it would not now be only fair to mention in our paper that "when life is at stake, an Anglo-Saxon sailor may be as much of a brute as any other sailor, a fact which the 'Scotsman's' sailors have unfortunately proved beyond doubt." Regarding this, we can only say that the truthfulness and pertinency of our friend's remarks are self-evident. It may, however, be said in explanation rather than extenuation of the "Scotsman" crew's behavior, that most of them were untrained men, picked up hastily in the port from which she sailed, the regular crew having deserted the vessel on account of a firemen's strike which was going on at the time. The fact is that the vessel was overdue because the firing had been so unskillfully performed by these raw men as to make it impossible to keep up steam; and it is of course true that any crew of any vessel, no matter what flag she may fly, when gathered up hurriedly in this manner, is likely to be readily demoralized in an emergency and to do things which disgrace humanity.

In his annual report to the Secretary of the Navy, Chief Constructor Hichborn, in commenting upon the progress already made in the use of electricity for driving auxiliary machinery on naval vessels, recommended its extended use. He also referred to the great amount of trouble, coupled with waste of space, occasioned by the docking of torpedo boats and destroyers in large drydocks, and as a substitute recommended the use of marine railways for the purpose, as the hulls of such vessels have to be inspected quite frequently, because owing to the thinness of the plates used they are more liable to be vitally affected by corrosion.

The Voting Machine Again.

Voting machines again gave a good account of themselves in the recent election in New York State, and it seems inevitable that these machines will, sooner or later, entirely supersede the present clumsy methods of voting by printed tickets. They secure the desired secrecy of the ballot, prevent mistakes and repeating, save much time for voters and election officers, enable the results of the voting to be much sooner known after the closing of the polls and lessen the expenses of elections. Makers of voting machines ought to have all the orders they can fill between now and next fall.

Commercial Review.

NEW YORK, SATURDAY EVENING, November 18, 1899.

THE ENGINE MARKET.

Favorable conditions dominate. Little seems necessary to say except that there is no reaction from the activity of the rest of the year, that shops are still crowded with work and months and months behindhand with orders, and that where prices show any tendency toward further change it is still in an upward direction. One engine company made an increase of 10 per cent. November 7, and the spokesman for another concern, which is one of the most influential, thinks a new advance in its figures not unlikely.

There is said to be an improved demand for engines from Mexico. This is to a considerable extent in connection with mining.

The Edward P. Allis Company is said to have on its books orders amounting to several million dollars which it has not yet touched.

McIntosh, Seymour & Co. have in hand, as usual, many orders for engines for important lighting and railway companies and for mill purposes. Some large units, among others, are booked for the Edison Electric Illuminating Company, of Boston. Export orders include those for Kimberly, South Africa, for lighting and power purposes; Buenos Ayres, for lighting; Mexico, for mining purposes, probably lighting, besides several for lighting in Japan. Shipment of the engines for Kimberly is held up owing to the war. The firm has an order for three engines for a tramway in Lisbon, Portugal.

Westinghouse, Church, Kerr & Co. have the contract for the entire engineering equipment of the new station of the Pittsburgh & Lake Erie Railroad, South Side, Pittsburgh. It will be on lines similar to those of the equipment of the Southern terminal station, Boston. It includes a 750 horse-power plant for lighting purposes and the outfitting of a seven-story office building. Exports of Westinghouse engines this year, in an ordinary way, and exclusive of large contracts, have been over 1,100 horse-power a month.

The Hooven, Owens & Rentschler Company is still deluged with work. Among its contracts may be noted: A 400 horse-power engine equipment for the New York Mills, a cotton factory near Utica, N. Y.; a 250 horse-power engine for the Union Bag & Paper Company, Sandy Hill, N. Y., and in the export line a 125 horse-power engine, which is being sent to a cotton factory near Mexico City.

The Fitchburg Steam Engine Company has sold for street railway purposes at Terre Haute, Ind., four engines of about 550 horse-power each.

Houston, Stanwood & Gamble, of Cincinnati, are reported to have a fine run of orders. They are shipping some engines to Cuba for sugar mill purposes.

Mr. Frank M. Pierce, president of the Frank M. Pierce Engineering Company, 26 Cortlandt street, New York, who spends much of his time traveling abroad and studying engineering conditions, has returned this fall from a trip to Europe. His attention this time has been particularly devoted to Sweden, concerning the outlook in which country he says to a representative of the "American Machinist:" "In Sweden there is an odd condition of affairs. The country is off the general line of travel, so the inhabitants live by themselves. The land is sterile, and there are none too many commercial avenues for Americans to work in. The people are naturally energetic, but in the use of modern appliances they are backward. They have only one short line of electric railway, and in a few of the cities there are electric lights, but electricity is just beginning among them. The people pay their chief attention to material comforts, such as eating, and have given little heed to many accessories of modern life which have become common to us. Yet they are an ingenious people, and have gotten up some fine inventions. When once improvements get thoroughly started among them they will spring up into new life. In three or four years from now there may be quite a demand for American goods in Sweden.

"There is to be found all through Europe and over the world a rapidly growing preference for American machinery and tools. It is hindered, however, because manufacturers of the United States do not intelligently adopt their data to foreign comprehension, and because of lack of American transportation facilities. Foreigners have control of most of these and levy high freights from us. In the last month, as a result of my study of foreign markets, I have received one order for twenty-two engines to be shipped to England. They are of various sizes and are destined for various purposes."

The Frank M. Pierce Engineering Company has received a contract for the installation of an electric light power plant in Porto Rico, which island Mr. Pierce visited last winter. The same company has received orders for five 800 horse-power direct-connected St. Louis Corliss special railway engines.

The General Electric Company this week received an order for dynamos and motors to the capacity of about 1,000 kilowatts for the Deep Leads Transmission mining system in Australia. J. G. White & Co. are the engineers for the installation.

NOTES THROUGH PENNSYLVANIA.

The Chambersburg Engineering Company is very busy hurrying forward the orders which have been coming in in a steady stream. A number of their power hammers have recently been shipped; one of 12,000 pounds has just been erected in the works of the Duquesne Forge Company, at Pittsburgh; one of 6,000 pounds is under construction for the J. G. Brill Company, of Philadelphia; and several of different weights have been set up in the mill of the Braeburn Steel Company. The Pullman Palace Car Company has also received a large hammer. Altogether, during October not less than fourteen have been built and shipped. A 126-inch gap hemp-packed hydraulic riveter has been sent to the R. D. Cole Manufacturing Company, of Newnan, Ga., together with a 10-ton hydraulic crane and hoist. Six of their 15x16-inch and 22x18-inch engines have been shipped to W. Clifford, of Jeannette, Pa., for connection to Capell fans. Altogether, the outlook in these works is most satisfactory.

T. B. Wood's Sons, Chambersburg, report no diminution in the call for their special power-transmission apparatus. Although their shop is compact and equipped with modern apparatus, it is feeling the strain of larger demand, and an extension is in contemplation.

The large addition to the plant of the Landis Tool Company, Waynesboro, is almost completed, and many of the machine tools are already in position. The factory as it originally stood was recently described in our columns, and the new extension more than doubles its facilities. The demand for Landis grinders comes from all parts of the world—Germany, France, England, Russia and elsewhere—and shipments during the past month have been more than satisfactory.

Recent shipments of traveling cranes from the shops of Maris Brothers, Philadelphia, cover one of 12½ tons capacity to Manila, for use in the refrigerating plant which the De La Vergne Company is erecting there; one of 25 tons for the Pennsylvania Manufacturing, Light & Power Company; one of 30 tons for the Monongahela Light & Power Company, of Pittsburgh, and one of 15 tons for the Risdon Iron & Locomotive Works, of San Francisco for shipment to Hawaii. Maris Brothers express themselves as pleased with the outlook, their shops having work for many months ahead.

CINCINNATI NOTES.

Among the manufacturers of machinery and tools October was a very satisfactory month, and so far as can be judged from the information received, was better than September. Some shops have been running fifteen hours a day, and in one reported case twenty-four hours a day. It is, however, a mooted question among manufacturers whether it is expedient to have a night force, and some feel that there is not enough gain in it to justify the additional expense, that men cannot work as well in the night time as they can in daytime; and certain manufacturers who have tried it have decided not to do so any more.

A new feature has appeared here in the fact that several manufacturers have had

letters of inquiry and orders from Bilbao and other seaport cities in Spain. Some few shipments have been made, and the advices received in answer to letters give hope of more orders coming here.

An important railroad company centering here wished to rebuild some freight sheds and make them a steel structure. It was impossible to get the material in time to suit them, and they have had to rebuild with wood. This is only one illustration of the difficulty of obtaining structural material. A little lower price has been reported in steel plates. Foundrymen here are kept very busy, and are working, in some cases, eight to ten times as many men as in 1896, and on higher wages. One concern which in 1896 hardly turned out 50 tons of castings a month, is now turning out 400 tons a month. This case can be duplicated by several others here.

The Cincinnati Milling Machine Company has not yet entirely completed the additions made to its plant, which, when finished, will be one of the finest in the city in all arrangements. It is enjoying a large trade, which, with improvement at home, has not shown any signs of falling off in the export branch.

The Rahn-Mayer-Carpenter Company has made several additions to its plant in the way of planers, shapers, drills, lathes and gear-cutters, including several lathes of its own make. It has had large orders from Italy and South American countries, and some inquiries from Spain, but its home trade is larger than its export.

The J. A. Fay & Egan Company has had a large space assigned to it in the Paris Exposition of 1900, and will make a much larger exhibit of its machinery than it did in the last exposition there. It has added another building to its plant, 130x60 feet. It has had a large order from the British Government for machinery to be used in making army wagons for transportation of supplies in South Africa. It has filled an order from the Indianapolis Street Railway Company for machinery for car shops, and one for the car shops of the Consolidated Street Railway Company here.

Dreses, Mueller & Co. have made some large shipments to Germany, some to Russia, and some to Cape Town, Africa. Their home trade is increasing, and if, ere long, they can find a more desirable lot they will erect a new building.

The Lunkenheimer Company reports a continued active demand for everything in its line. Its export trade still continues in good proportions, with a larger increase in the home market. It is understood to have done some business with Spanish dealers through its London house.

In our Dayton report published last issue it was stated that the Patterson Tool and Supply Company was engaged in manufacturing "jack saws" and other small tools. This should have read "hack saws."

CHICAGO MACHINERY MARKET.

It is often said by those familiar with different markets that the West looks for a speedier return for its investment than does the East. If the returns do not begin to come in within, say, six months, the enterprise is regarded with disfavor. In consequence of this impatience there is said to be a considerable amount of new work that is pigeon-holed, because power and other necessary appliances cannot be bought within the desired limit of time. Of inquiries there are a plenty, but the proposing buyers retire in dismay from the field when sellers begin to talk a year, or perhaps eighteen months. But, in spite of that tendency among Western buyers, there is in progress a broad and deep education, which teaches that it is not always wise to await the leisurely resolutions of directories in January, if time is to be made in getting proposed undertakings under way. And among the more progressive manufacturers the current conditions of the machinery market, especially so far as it applies to power, are so well understood that they are now placing orders which ordinarily would not be placed until February. It may be this forehandedness that is largely responsible for the steady buying that is in progress. Engine and boiler makers have gone deeply into November. Its wonted earmarks do not appear. There is no tapering off of trade that is yet discernible. It may come a little later, and that it does not come now is a matter of considerable surprise. The fact is, however, that the great majority of makers in these lines report no diminution in the demand from that which has prevailed all summer and autumn. There is a serious scarcity of power available for early needs. This is illustrated by an instance that occurred recently. An engine builder put in two bids in response to specifications filed for a 500 horse-power engine. One was for a new engine, the other for one of the same make that had seen four years' service. For the second-hand engine $250 was asked above the price of the new and better constructed engine. The premium was cheerfully paid, for the delivery was immediate, and the new one could not be promised under six months. Prospective buyers are persistently offering bonuses for earlier deliveries than are named.

In a small way the local trade at Chicago is somewhat depressed by the threatened strikes in the building trades. Save for this tiny speck the industrial sky seems unclouded. The producing capacity of engine and boiler makers has increased slightly, but the demand has made gains correspondingly large or greater. The iron ore regions are among the good inquirers, but it is difficult to name any field of industrial activity that is not calling loudly for more power.

Mining interests are notably good buyers of electrical machinery just now. The Rocky Mountain region is calling for a vast amount of equipment, and the copper districts of Lake Superior are alive with new projects which give every indication of longevity. Many new shafts will be sunk next spring, and all of them are calling for electrical machinery. There is no diminution in the inquiry from manufacturers, and the outlook is said to be as bright as at any time this year.

The Union Malleable Iron Works, of Moline, Ill., have been equipped with a 500 horse-power generator and motors to correspond: The Snell Cycle Fittings Company, of Toledo, Ohio, has installed a 250 horse-power generator, with motors of corresponding power. Printing establishments continue to substitute electrical power for steam, one Western plant now negotiating for a 500 horse-power generator and a large number of motors. Among smaller installations, the Lithotone Colortype Company, of Chicago, has put in a direct-connected electrical plant, and the "News" Company, of Hutchinson, Kan., and the "Express" Printing Company, of Red Oak, Iowa, have equipped their offices electrically.

Quotations.

NEW YORK, MONDAY,
November 20, 1899.

Iron—American Pig, tidewater delivery in 1900:—

Pennsylvania Irons:

No. 1 X foundry	$24 65 @ $26 70
No. 2 X foundry	23 65 @ 24 70
No. 2 plain	22 90 @ 23 70

Alabama Irons:

No. 1 foundry	23 25 @ 23 75
No. 2 foundry	22 25 @ 22 75
No. 3 foundry	21 50 @ 22 00
No. 1 soft	23 25 @ 23 75
No. 2 soft	22 25 @ 22 75
Foundry forge	20 50 @ 20 75

Bar Iron — Base sizes — Refined, mill price on dock, 2.30 @ 2.40c.; store price, 2.60c., upward; common from store, 2.50 @ 2.60c.

Tool Steel—Base sizes—Standard quality, 7 @ 8c.; extra grades, 12 @ 14c.; special grades, 16c. and upward.

Machinery Steel—Base sizes—Ordinary brands from store, 2.90 @ 3c. in small lots.

Cold Rolled Steel Shafting—Base sizes—From store, 4 @ 4¼c., in small lots.

Copper—For Lake Superior ingot, 17 @ 17⅛c.; electrolytic, 16¾ @ 17c.; casting copper, 16⅝ @ 16⅞c.

Pig Lead—Carloads, 4.62½ @ 4.65c.; wholesale lots, 4.60c.

Pig Tin—In 5 and 10-ton lots, f. o. b., New York, irregular at 27¼ @ 28c.

Spelter—Prime Western, 4.60 @ 4.70c., New York delivery.

Antimony—In cask lots or over, Cookson's 10.95 @ 11.25c.; Hallett's, 9¾ @ 9⅞c.

Lard Oil—Prime City, present make, 44 @ 47c. in jobbing lots.

Recent French Engineering.

BY W. H. BOOTH.

We hear very little of the French mechanical engineers and are apt to assume that there is not much to be learned from them. It is, however, a mistake to suppose that the French are not good engineers. They have long been noted as men of great scientific attainments. The whole of our steam engineering calculations today are based on experimentally determined figures by a French chemist, Regnault. Then the most famous of physicians, Dulong, Petit and Marriott, were all French, and to France more than to any other nation the sciences of chemistry and physics owe their firm bases. A few days ago I had occasion to visit the country, and in a brief time saw much of interest, particularly the new "ferry" at Rouen. Rouen is a place of considerable importance, and is intersected by the river Seine, which is one of the largest rivers in France, and, at Rouen, is still tidal. Like the Thames at London, there is a certain stone bridge up to which large vessels can come, but below which a means of crossing is desirable for both passengers and vehicles. In London the problem was solved by means of a huge bridge, the central span of which consisted of two hinged platforms. These are counterbalanced by weights concealed in the piers, and they fold up against the traffic when a masted ship or large steamer requires to pass higher up the river. Rouen, a much smaller place, with of course very much less cross-river traffic, could not afford such a bridge as this, nor was it desirable or necessary. The problem has, however, been tackled in a very satisfactory manner. A tower is erected on each bank. These towers are of considerable hight and are connected at the top by a girder bridge. On the lower boom of this girder runs a long, flat, wheeled platform, and from this platform there is hung, by a large number of surpension rods, a platform of considerable size with accommodation for passengers and vehicles. It resembles part of a ship's deck and carries an overhead bridge or second deck, on which is placed an electrically driven winding gear. From the platform on the top girder of the bridge a loop of rope comes down to this gear. The two ends of the rope pass right and left over pulleys on the top girder and are taken horizontally to the shore towers. When the electric winding gear revolves, the effect is to pull one side of the rope tight and let out the other side slack. The top platform travels to the tight side and the suspended ferry platform below follows it. The ferry platform is at the street level, some 20 feet or less above the water. Seen at a distance, this platform appears very small, but it is really of considerable size. The upper many-wheeled traveler appears at a distance like a caterpillar crawling under a stick. This novel ferry is no hindrance to navigation, and appears to afford rapid communication at frequent intervals. The current to work it seemed to be brought from the system of the electric tramways, which have been at work in Rouen some time very satisfactorily, the power station of which I found time to see. There were American and French engines at work in it, and the French engines were described as exceedingly good, and looked it, too.

In Paris a great deal of unseen work is in progress. All the railway termini are to be connected to one central station by means of underground lines. These are in progress, and in some places the surface of the streets has sunk owing to the workings beneath, but otherwise very little is visible of the great work that is proceeding. So far as I could learn, the motive power will be electricity.

I saw no electrical tramway equipment in Paris of the overhead type, though there is a line at Versailles. In Paris, however, I saw considerable numbers of very large tramcars electrically operated by means of accumulators which were contained in a flat rectangular box suspended beneath the car and between the two trucks. Running on the same lines, and of very much the same size and general appearance, are numbers of steam cars on the Serpollet system. These cars are quiet and clean, and contrast very favorably with the steam motor as I have seen it everywhere else. In this Serpollet motor the French have solved the problem of steam traction in a way that can only be called perfect, so far as regards the appearance presented in the street and the general cleanliness. Our English steam cars have ever been a nuisance, dirty and evil smelling. The Serpollet car has a nearly inaudible puff for its exhaust, and the machinery and boiler make a very small external show indeed. The Serpollet system of steam generation is a revival of an old idea which aimed at injecting a small quantity of water into highly heated metal, sufficient every stroke of the engine to supply the steam for one stroke. Water is injected into tubes of "U" shape, very thick and strong, and with only small passages through them. It is said these tubes do not quickly choke, and that if they do ever become furred up they can be cleaned by careful application of hydrochloric acid, all of which I do not doubt the French engineers with their careful methods will carry out. Trains of as many as five tramcars are run through the streets. I traveled by one as far as Versailles, past the new exhibition buildings, which are in a state of considerable forwardness.

It is not possible to avoid the conviction that automobiles are making much progress. The ordinary Parisian cabby gets a medal or a decoration if he runs over a foot passenger, and I am told the foot passenger who is run over is fined. I can believe it, for the French cabby is a blackguard and will not make an effort of any kind to avoid running over a child. Added to this terror is the modern automobile. The automobile man is evidently fined unless he keeps going at twenty miles an hour. One that I saw in the Bois de Boulogne must have been doing quite thirty miles on a tricycle. A very considerable number of various kinds of vehicle are to be seen, some of which are of neat design. In fact, there is beginning to be the appearance about an automobile which differs from the once common appearance of the horseless vehicle. The early automobiles so evidently were vehicles minus a horse that it was clear their designers had not been able to forget the horse, just as the early railroad cars resembled the stage coach for some time, before the influence of the curved body wore off the minds of their designers.

Altogether, I saw in a short visit a good deal of French mechanical engineering which pointed to a certain ability to achieve results in some directions that other peoples have failed to secure. And I heard not a word of the very recent *"affaire."* It all seemed to have evaporated like petrôl, which it also resembled in having been very explosive during evaporation.

London.

The Limiting Size of a Twist Drill.

Is there a limit of size for twist drills above which they should not be made or used; and if so, what is that limit?

There are those whose experience ought to qualify them to judge, that think there is such a limit, and that it may be placed at about 1½ inches diameter. Yet twist drills are regularly made by at least one manufacturer up to 5 inches diameter, and are regularly cataloged up to 3 inches, both straight and taper shank.

We all know that it takes considerable force to push a large twist drill through solid steel, and lots of cast iron is put into radial and other forms of drilling machines in order to keep the deflection of the arms within a reasonable limit when using large drills. At the same time we know that if we want to enlarge a hole already drilled and attempt to do it with a twist drill, it takes little or no force to do the feeding, and indeed the drill will feed itself (sometimes much too rapidly) if the first hole is nearly the size of the enlarged one. This proves that when drilling is being done the outer portions of the lips tend to draw in or feed themselves, while the central portion resists this drawing-in tendency; the machine and its feed mechanism having to supply the difference between the two forces. This was very beautifully shown by some experiments made by Prof. L. P. Breckenridge in 1888, and described in the Journal of the Engineering Society of the Lehigh University for October of that year.

Prof. Breckenridge asked himself the question, "What pressure comes on a drill-press table when drilling cast iron with a one-inch twist drill?" and in order to answer this question he

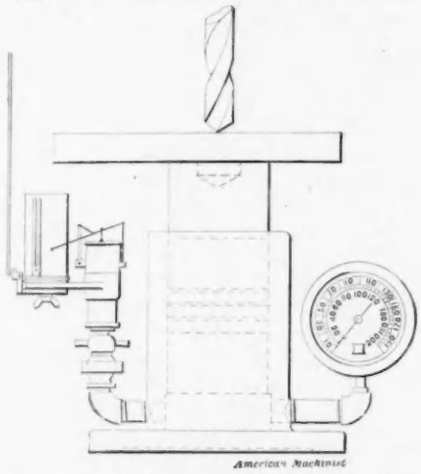
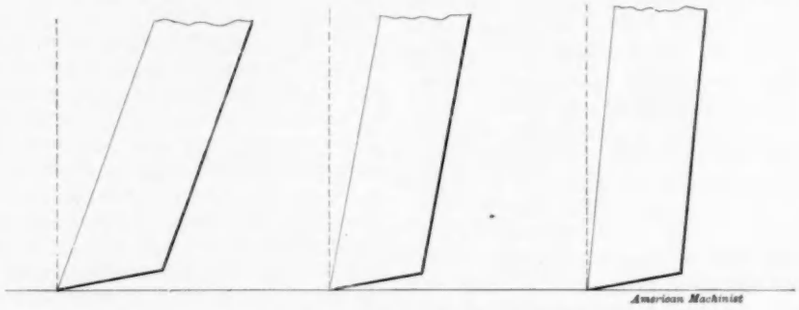


FIG. 1. APPARATUS FOR MAKING DRILLING DIAGRAM.

made the apparatus shown in Fig. 1. This consists of an upright cylinder closed at the bottom and fitted with a plunger, the area of which is exactly 10 square inches. In the cylinder, below the plunger, oil was placed, and grooves were turned near the bottom of the plunger to answer for packing. On top of this plunger the work to be drilled was placed, so that the downward pressure of the drill would produce a pressure per square inch upon the oil equal to one-tenth of the total drill pressure. At the bottom of the cylinder connections were made to a gage and to an indicator as shown, and arrangements were made to have the downward motion of the drill-press spindle rotate the indicator drum, so that in this way an indicator diagram is made, its length corresponding to the downward movement of the drill and its hight to the downward pressure exerted by it. The drill-press used was built by Prentice Bros., of Worcester, and had back gears and an automatic feed. The plates drilled were of cast iron and were of various thicknesses—½ inch, 1 inch, 1⅛ inches and 2 inches. Some were planed on one side, some on both and some not at all. Morse taper-shank drills were used, ¼ inch, ½ inch, ¾ inch, 1 inch and 1¼ inches diameter; they were ground upon a twist-drill grinder, and the iron was of about ordinary hardness—not the softest, nor yet the hardest; 143 holes were drilled, and the last of a series of tables given by Prof. Breckenridge gives the following figures:

Diam. of Drill Inches.	Maximum Pressure on Drill while Drilling at Start.	Maximum Pressure on Drill while Drilling with Full Diameter of Drill.
¼	400 lbs.	350- 400 lbs.
½	900 "	800- 900 "
¾	1,100 "	800- 900 "
1	1,450 "	1,000-1,150 "
1¼	1,800 "	1,000-1,150 "

These figures speak eloquently of the force required to push the central part of a drill into cast iron, and when drilling steel the effort must of course be much more severe. They also show that in the case of the 1¼-inch drill, for instance, as much as 800 pounds drawing-in force was exerted by the outer portion of the lips of the drill, and that the central portion not only used up this force, but required 1,000 pounds more to be supplied by the feed mechanism. In other words, they show that when the outer portions of the lips of a drill begin cutting they tend to pull into a solid hole, the same as they do when we try to enlarge a hole with a twist drill, and that this pulling-in simply relieves the feed motion of a part of the work of pushing the resisting central portion through.



FIGS. 2, 3, 4. ANGLES OF CUTTING LIPS OF A DRILL AT VARIOUS POINTS.

We are in the habit of thinking of the angle of the spiral of a twist drill as being what we see when we look at the drill, i. e., the angle at the outer edge of the groove. This angle for medium-sized drills, say from ½ inch up, is about 20 degrees, as shown in Fig. 2, which we may take to represent the outer surface of one side of a twist drill with its spiral lines straightened out. But really most of the cutting edge has much less cutting angle, or rake, and if the lips were carried to the center they would have none. Taking the central portion of a 5-inch drill for instance, equal to half the total diameter of the drill, and the angle of the spiral would be as in Fig. 3, and going down to 1 inch diameter the angle is as shown in Fig. 4. At the center this drill is ½ inch thick and must be literally pushed through the work, or if thinned on the point, as is sometimes done, and ought always to be done with large drills, the cutting angle is necessarily a negative one, and the stock is simply crushed or pushed off by that portion of the edge.

It is this central portion of the drill which must be forced through the work, while the outer portion must be held back to keep it from screwing itself through at a rate entirely too fast for the safety of the drill. This of course sets up two opposing forces within the drill itself, and if the center of a drill be made too thin it splits lengthwise, while if it be made too thick the resistance of that portion becomes enormous.

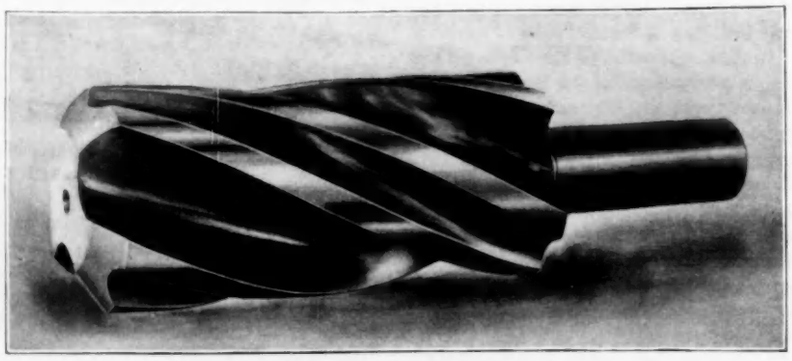


FIG. 5. A FOUR-LIPPED DRILL.

What is thought by many to be a better plan is to use ordinary drills up to about an inch diameter, and then follow with such a tool as is shown in Fig. 5, which resembles the outer portion of the twist drill, so far as its cutting action is concerned, but has twice as many cutting edges and is more efficient as a cutting tool. Its center is plenty thick enough for great strength, and it follows a drill of from 1 to 1½ inches diameter, according to circumstances. It is believed that holes above 1½ inches diameter can be drilled faster by the use of a regular drill followed by this tool, and both of them pushed to the limit of their capacity, than is possible where the full diameter is drilled from the solid at a single operation, and with this tool the drilling machine needs to supply only the rotating

force; the tool will feed itself almost, if not quite.

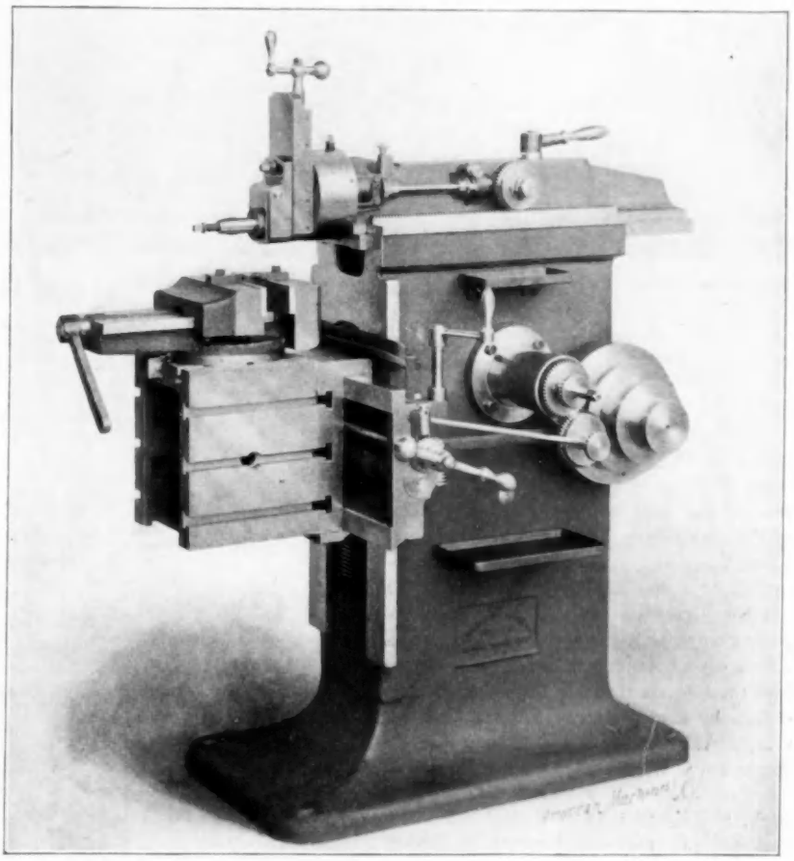
If Prof. Breckenridge's experiments had extended far enough so that the figures could have been given for a 5-inch drill, the results would probably have been somewhat startling. The tool shown in Fig. 5 is one that ought to be better known where large holes are drilled from the solid.

A Shaper with New Automatic Down Feed.

The tendency at present is to apply automatic feeds to the down feed of shapers, and we herewith illustrate one of the latest examples of such an application. The photograph gives the general appearance of the mechanism, and its construction and method of operation will be readily understood from the other engravings, which are made from blueprints of working drawings.

A section of the swivel head is given at Fig. 2, which shows the method of its attachment to the ram, the means adopted for clamping it in any position and the means of transmitting the feed motion to the vertical screw from the spur gear seen at the rear of the head. This spur gear is rotated by the pinion *a*, Fig. 3, which pinion is at the end of a sleeve that is a running fit upon a longitudinal shaft shown separately in the upper portion of Fig. 3. At the right-hand end of this shaft are bevel gears which connect it with a spur gear that runs in a rack placed on top of the ram gib. This spur gear (*b*, Fig. 3) rotates of course as the ram moves, but it transmits motion through the bevel gears to the longitudinal shaft only through the medium of the leather friction washers *c c*.

Attached to the shaft at the left of the bearing is the tappet collar *d*, shown separately at Fig. 4, and the projecting lug on



IMPROVED SHAPER.

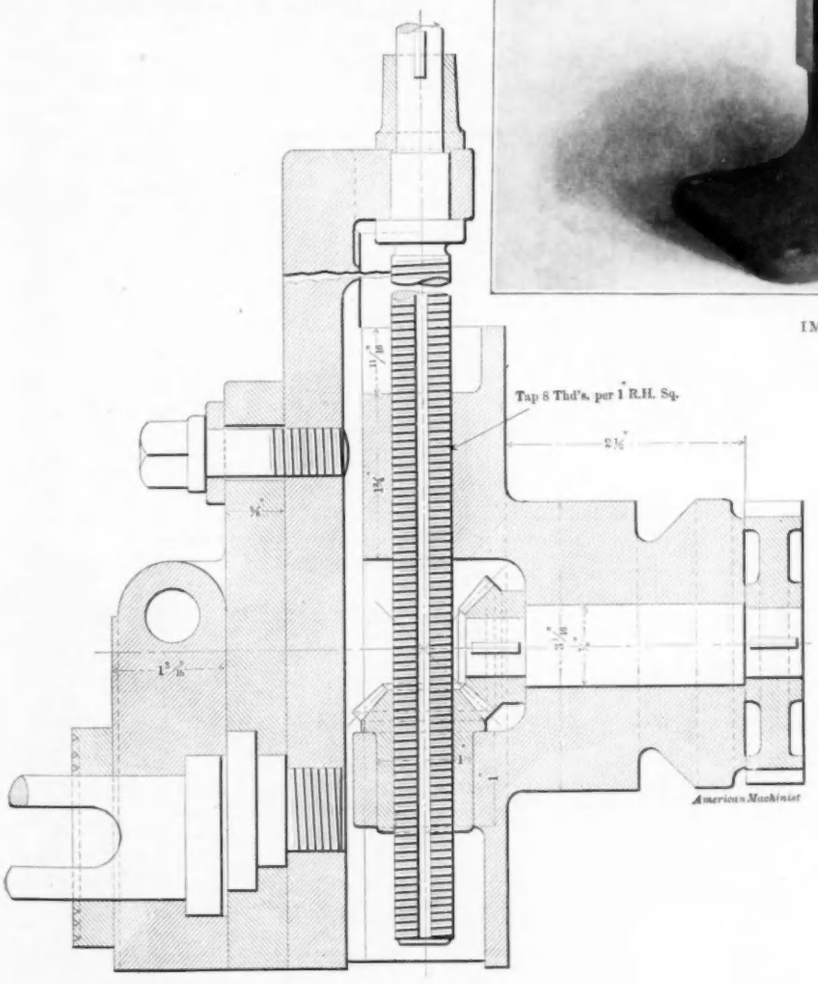


Fig. 2

SECTION OF SWIVELING HEAD OF SHAPER.

this collar limits the rotation of the shaft to any desired amount as determined by the position of a segmental worm-wheel shown separately in Fig. 5, the hub of this wheel forming the bearing in which the shaft turns. Keyed to the shaft at a point farther to the left is the pawl carrier *e*, having the usual reversible plunger pawl which, by being turned upon its axis, reverses or stops the feed, and the number of notches of feed is altered by turning the knurled knob which rotates and holds in position the worm segment.

The frictional resistance of the leather washers may readily be adjusted by means of the nut shown, and never need to be very great.

The other features of the shaper will be readily seen from the photograph. It is built by the Springfield Machine Tool Company, Springfield, Ohio.

Sacrifice to the Engine God.

India is a country where the gross superstitions prevailing among the natives frequently produce the most horrible and inconceivable tragedies. Many of these are

done in secret, but now and then they come to light, and give a startling reminder to the Englishmen in India that "East is East and West is West, and never the twain shall meet." In the up-country town of Hingoli, in the Deccan, is a cotton-ginning mill owned by natives. One of the proprietors, a Parsee named Nowrojee, looks after the engines and machinery of the mill. Lately the machinery has not been working well, and the engine in particular has given considerable trouble. The native engineers seem to have got it into their heads that the engine was really driven by a god which took the form of steam. When it went wrong they thought the god was angry and needed propitiating by the sacrifice of a human being. One night a Hindoo laborer named Govindah was passing the mill. Some workmen, sitting in the yard smoking, called out to him to join them. The gang had just been discussing the vagaries of the engine and the necessity of offering a sacrifice to it. The whole party walked toward the boiler, and some of the men seized Govindah. Others swung open the furnace door and the unfortunate man was crammed inside, head first. They had to loose their hold of his body in order to shut the furnace door, whereupon Govindah, who was a very powerful man, managed to get out and free himself. He was frenzied with pain and fear, and had sustained ghastly injuries. The engineers did not make a second attempt to thrust him in the furnace, and he crawled away to his hut.—"The Chicago Record."

A New Lubricant Composition.

A composition to be used as a lubricant, and first devised to be used on bicycle chains, has recently been patented. It is said to be effective as a lubricant, with the advantage that it contains no oil to collect dirt and dust to soil the clothing, and that it will not gum or harden. One pound of beeswax is melted and one-half pound of plumbago is thoroughly stirred into it, and when the mixture has cooled to 90° F., one and one-half ounces of glycerine are added, and the mixture is then poured into molds to cool. The glycerine is used to keep the mixture from becoming too hard, and the amount of it may be varied as desired. The patentee of this mixture is Frank T. Cook, Antelope, Ore.

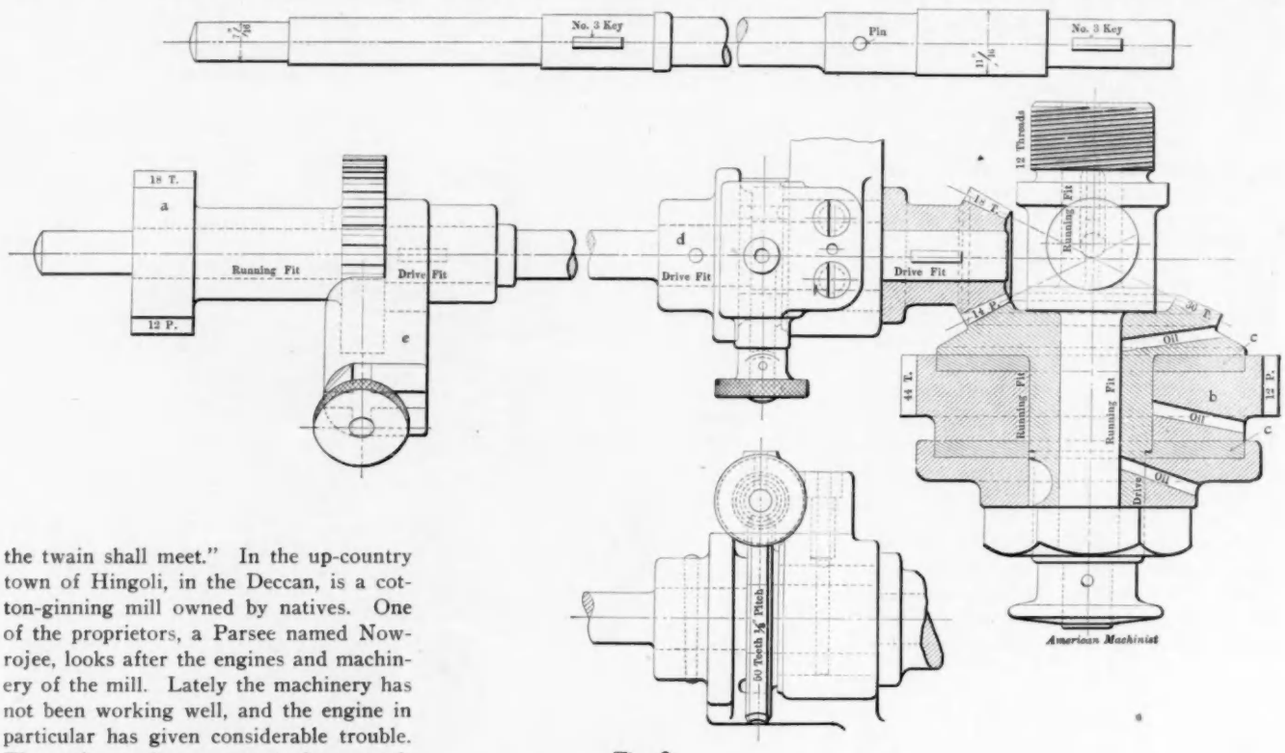


Fig. 3

MECHANISM OF DOWN FEED FOR SHAPER.

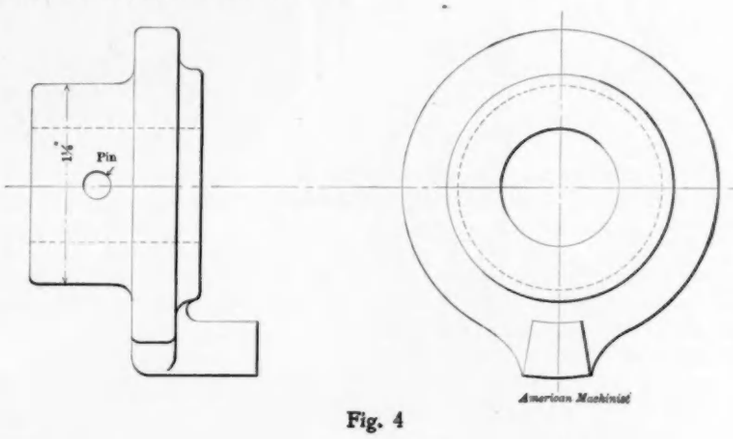


Fig. 4

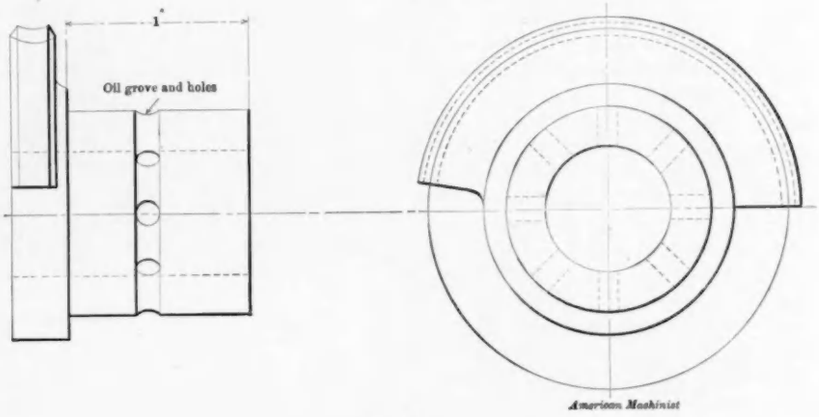


Fig. 5

DETAILS OF FEED MECHANISM FOR SHAPER.

Making Revolving Crane Beds—II.

BY JOSEPH HORNER.

The pattern work and molding for the revolving crane bed which was illustrated in the previous article are here shown. Fig. 4 shows the pattern in plan and elevation; the remaining figures, some selected core boxes and the molding. The pattern is made in three main portions, the broad bed *A* and the two uprights *B B*. The latter are not fastened, but dowelled only, because this arrangement is more convenient for molding. Each is boxed up with sides and cross bars, and the broad surfaces of the bed have open plated joints. Prints *a a* are screwed on (Fig. 7) to correspond with the outlines of the numerous ribs, and the recesses for the jib *b b* and the intermediate space *c* are printed for cores. Prints *C C* are fitted against the uprights to receive the lightening cores, to give the section in Fig. 2 in the previous article. The various dispositions of the timber in the pattern are clearly apparent from the drawings.

It is not necessary to show all the core boxes. Four will suffice. There is, first, one of the boxes, Fig. 5, for the spaces which receive the rollers upon which the crane revolves. This box contains portions of the bosses for the roller pins. Two cores are made from it, and then the bosses are reversed, and two other cores rammed. Then there is one box, Fig. 6, which, with alterations, serves for four cores. Another box of similar shape serves for four others, making eight cores, which form diagonal ribs, seen in plan in Fig. 1 in the previous article, and in Fig. 8 in this. There are two plain boxes which complete the coring-out of the ribbed portion of the bed. Then there are two boxes for the front; one of which, that for the recesses for the jib foot, to suit the prints *b b*, is seen in Fig. 7. After one core has been made from this, the bosses in it are reversed for the one on the opposite side of the bed. The box for the lightening core which comes midway between is of similar outline, but wider, and destitute of bosses, and fits the impression made by print *C*. Lastly, there is the box, Fig. 8, for lightening out the uprights, to suit the prints *C C*.

When making this bed, common flasks are used. The two views, Figs. 9 and 10, will suffice to illustrate the molding. The first shows the drag cored up ready for the cope; the second shows the complete mold in longitudinal section ready for pouring.

The two flask parts *A A*, being selected of a suitable size, are cottered together and laid over the bed pattern, the joint face *a* being downwards, and the pattern, laid upon it, is rammed. There is a deal of space left about the areas *B B*, and this is mostly filled up with cinders. When the pattern is nearly rammed up, the flask *C* is put on and cottered, and the ram-

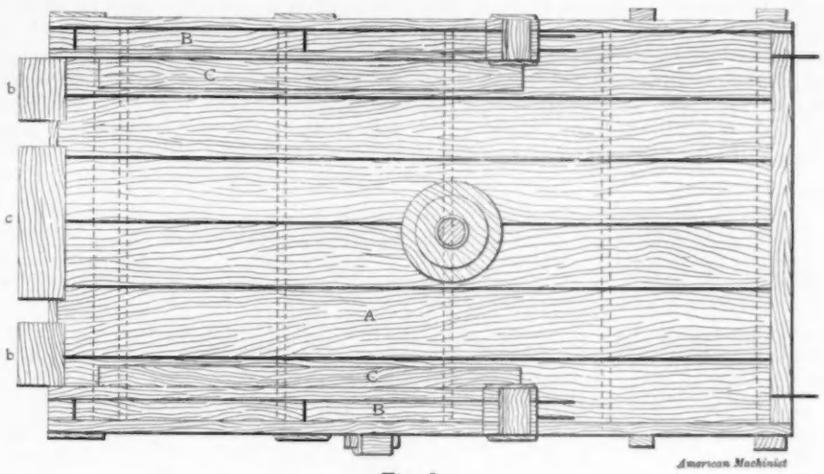


Fig. 3

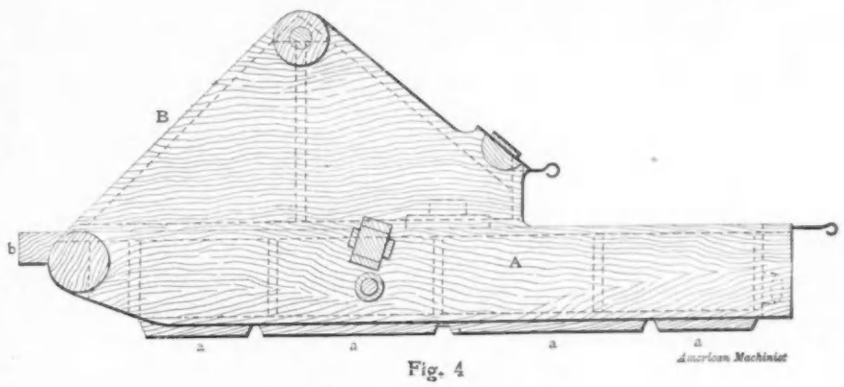
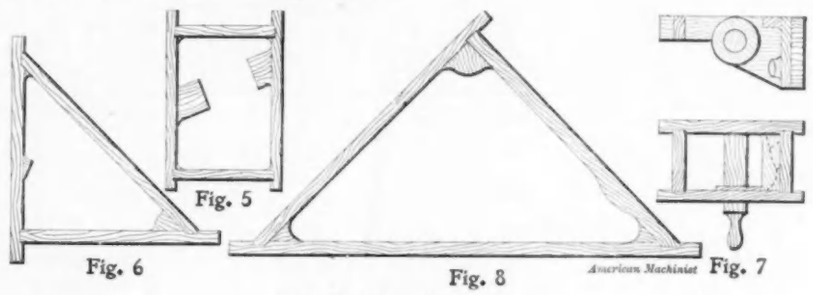


Fig. 4

PATTERN FOR CRANE BED.



SOME OF THE CORE BOXES.

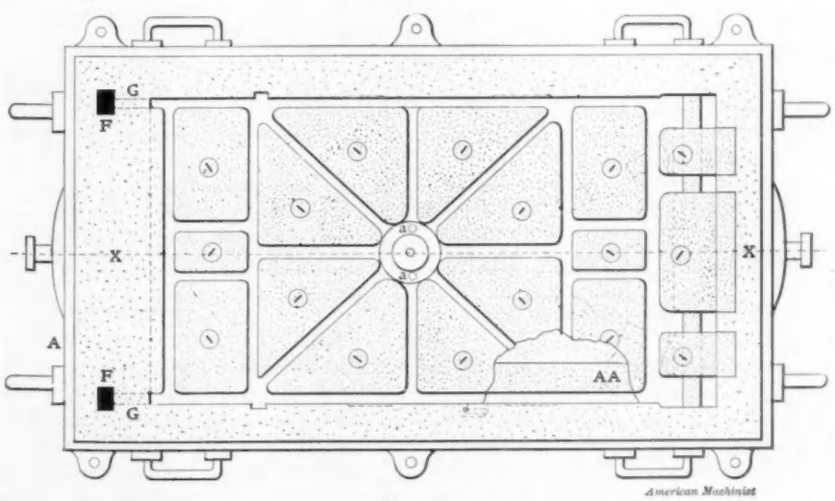


Fig. 9

DRAG WITH CORES.

ming completed. The flasks are then turned over, and the cope *D* laid on and the top face rammed, runner pins being inserted for pouring, and vent pins over each of the prints *a*, to bring off the air from the cores.

After the parting and cleaning of the mold, the cores are inserted, Fig. 9. This figure illustrates the mold in plan in the joint face *a*, the cope being removed; and Fig. 10 is a longitudinal section of the complete mold in the center plane *x x*.

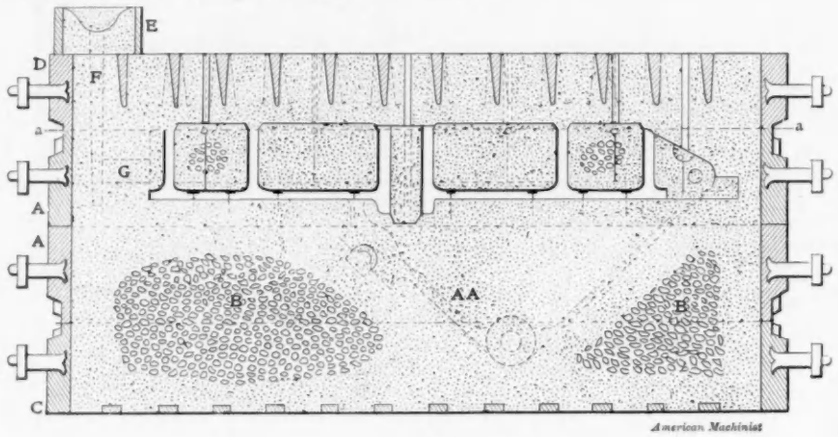


Fig. 10

THE MOLD COMPLETE.

The following points may be noted: The first cores to go in are small bearing cores, those which lighten the uprights, and which are made from the box, Fig. 8. A portion of one of the latter is seen at *A A*, in Fig. 9, and its outline is indicated in Fig. 10.

The broad prints *a a*, seen in Fig. 7, though not necessary, are very convenient. It is practicable to set the large cores on chaplets by measurement, without the use of prints; and side-spring chaplets and the pressure of the cope would maintain them in position. But it is more convenient to employ the broad, shallow prints, for then, the cope being turned over on blocking, bringing the print impressions uppermost, the cores are laid each in its position, and bolted up firmly. The cope is then turned over in place on the lower flasks and the thickness of metal tested with clays, and any necessary corrections in the cores made. It is well to insert a few chaplets in the bottom, between the cores and the face of the mold.

The vents from the cores all come out through the cope, the holes for which are indicated in Fig. 10.

The holes for the roller spindles, it will be observed, are not cored, but left to be drilled in the solid metal. These have been frequently cored and bored subsequently, but, proving a source of trouble, it has been found better to drill in the solid. To insure boring these at a correct angle, a special templet is rigged up.

The bed is poured from one end. A long pouring basin *E* connects two ingates *F F* with two runners *G G*. The metal thus runs along the sides of the mold without striking against the cores and fills it quickly. The center boss is fed through holes, the position of which is indicated by the dotted lines *a a*, Fig. 9. The thick lugs at the front, or jib, end are also often fed.

An Endshaking Tool.

BY A. H. CLEAVES.

I should be glad to give the name of the inventor of the tool described in the following article if I could, but it dates too far back in watch making history for me to locate its origin.

The "Arkansaw traveler" asked the old settler how long he had been there, and, pointing to the distant trees, he replied: "They woz here when I kum."

So this particular tool, with a few others, such as the jeweling rest, wigwag polisher, etc., started in the early days of American watch making, and I believe have never been displaced nor substantially improved upon by more recent appliances for the same work. As illustrating a valuable principle in gaging or measuring tools, I trust it will be of interest, not only to watch makers, but to others who might use the device in other lines of work.

To explain then at the outset what is meant by endshaking I will refer to Fig. 1, in which *L* is a pinion in a train of watch wheels. *A* and *B* are the shoulders of the same resting in the jewels *C C*. The allowance made for this pinion to move freely endways between these jewels is called the endshake, and the tool illustrated in Figs. 2 and 3 is called a pillar-plate endshaking tool, as it finds the distance between the jewel setting seat in the pillar plate and the face of the jewel inside of the top plate, and also the cut required on the jewel-setting shoulder to give the proper distance for any pinion, including its endshake, that is selected to run in the watch movement to be measured.

The general appearance of the tool is shown in Fig. 2, while Fig. 3 is an enlarged view of its working parts, showing the method of use. The point *b* of the spindle *g* is brought against the face *H* of the jewel *C* of Fig. 1, as shown in Fig. 3, in which the frame of the movement is shown in section, being held against the plate *h* by the tail spindle *i*. Spindle *i* is kept in position by the spring *j*, Fig. 2, a

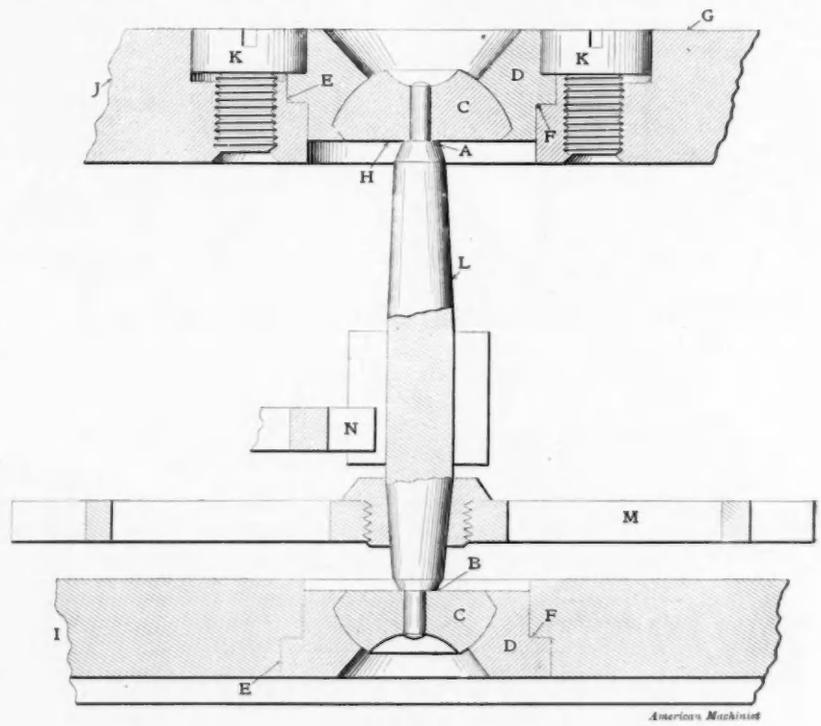


Fig. 1

ENLARGED SECTION OF PORTION OF A WATCH, SHOWING THE WORK TO BE DONE.

handle *k* being provided to draw back the spindle when inserting or taking out a movement. The shell point *a* of the hollow yoke spindle *l* is brought against the sink shoulder *F*, Fig. 1, of the pillar plate. As will be seen from Fig. 3, the two tips a spring chuck running in a lathe. The cutter for this is held in the little slide rest *f*, Figs. 2 and 3, shown in numerous views, and which is a part of the yoke spindle *l*.

Let *a*, *b* and *i* be brought together, also tween *B* and *F*, Fig. 3, will be the difference between the distances *A F* and *A B*, or *B F*, Fig. 1; that is, the tool *f* will be advanced beyond the spindle *e* the amount of the cut on *D* to give no end shake.

To get the endshake the sub-spindle *m*

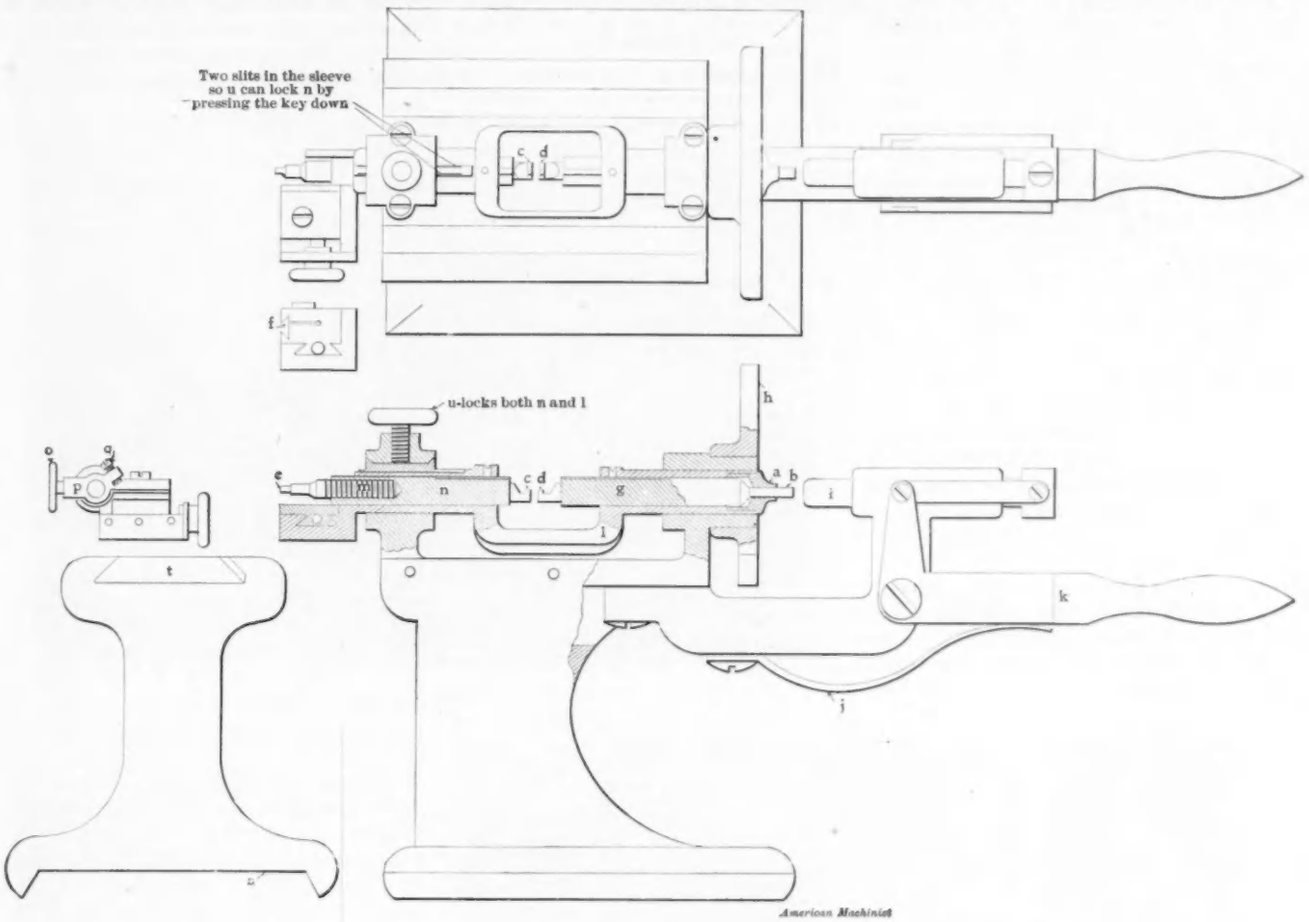


Fig. 2

PILLAR PLATE ENDSHAKING TOOL.

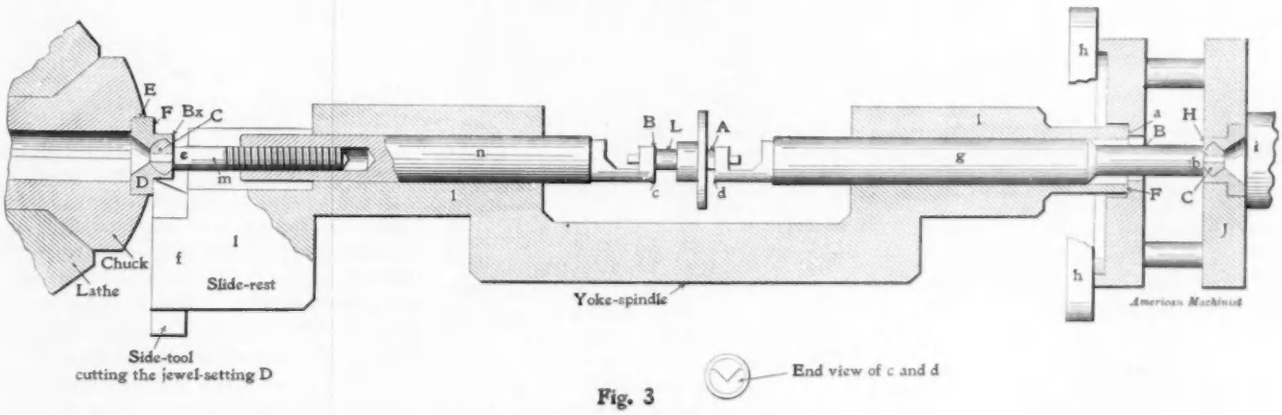


Fig. 3

WORKING PARTS OF ENDSHAKING TOOL.

a and *b* measure the distance between *H* and *F* of Fig. 1, which, supposing no end shake, is obviously equal to the distance *A B* of the pinion plus the distance *B F* of the jewel setting.

The work done by the tool is the cutting of the shoulder from *B* to *F* on *D*, Fig. 1, the latter being held at *E*, Fig. 3, in the points *c d*, and let the point *e* and the tool *f* be adjusted to be flush with each other. Then, if the movement be inserted as in Fig. 3, and any pinion picked up at random be placed in the fork rests *c d*, Fig. 3, the shoulders *A B* of the pinion *L*, Fig. 1, resting against the ends of the forks *c d*, it is plain that the distance between the spindle *n* is threaded and provided with a collar *p*, a thumb screw *o* and an adjusting screw *q*, as shown in the end view of Fig. 2, and the adjustment of the tool to give a cut to the jewel setting which shall provide endshake to the pinion is made by setting *m* forward of the cutter by the adjusting screw *q*. It will be

seen that setting *m* forward gives a less depth of cut to the jewel setting, by which it is prevented from going so far into the pillar plate, and thus provides the needed endshake. The base of the tool fits a lathe bed at *s* as a tail stock. The whole measuring apparatus is locked when ready by thumb screw *u*, and slides up to work in the guide bed *t* until *e* reaches *C* at *Bx*. Open bearings are used to admit the yoke spindle *l*, which, together with *g* and *n* are provided with key-ways to prevent revolving. If the thread on *m* is right-hand. the stop screw is used before the collar in getting the endshake.

Phosphor Bronze Lathe Centers—Tool Room Practice.

At the shops of the Cincinnati Milling Machine Company they find it advantageous to use phosphor bronze for the tail centers of lathes when they are turning work upon arbors. They find that these centers are much less liable to wear the centers of the arbors out of truth and are in every way satisfactory. Arbors in this shop are tested each time they are returned to the tool room on a pair of bench centers with an attachment for applying to the surface of the arbor the "feeler" of a gaging instrument, such as we showed in use for testing the alignment of milling machines in our issue of March 23, last.

A feature of their tool room is a series of shelves on which are placed all tools that are returned from the shop, and which have not been inspected. By thus having a special place for such tools, they are much less likely to pass to their regular places and again be issued without inspection, and the arrangement therefore makes it much more certain that all tools will be properly inspected and in thorough good order before being given out to workmen; the efforts of the tool-room force being always to keep these shelves as nearly cleared off as possible.

For certain operations (on turret machines and milling machines especially) quite a number of tools are used on one job, and it is the practice in this shop to keep all such sets of tools in a small wooden box, in which is a compartment for each tool. These boxes have a hinged lid upon them, are painted black, and at the end bear brass plates designating the job for which the tools are used. These sets of tools are then handed to workmen on check, the same as one tool would be in the ordinary course. Thus they are always together. An empty compartment at once indicates a missing tool, and much time is saved.

These shops, by the way, are in course of enlargement, and a dwelling-house standing near the shop buildings and on ground being cleared for the enlargements is being transformed into an office building. This transfers the office to the opposite end of the shop building from where it formerly was, and leaves the room formerly occupied by the office available for shop use.

An Exhibit of American Machinery in Yokohama.

The accompanying illustrations are exterior and interior views of an American machinery exhibition building which has been open in Yokohama, Japan, for about two years. It belongs to F. W. Horne, an account of whose transactions for the equipment for the marine shop of the Chinese & Eastern Railway was published in our Commercial Review Department, November 16. Mr. Horne has also exhibition rooms in several other cities of the Far East, including Shanghai, China; Osako and Tokio, Japan. He handles the tools, engines and allied products of about thirty American companies, comprising some of the most reputed, and obtains them by out-and-out purchase, not by consignment.

The pictures of which these cuts are a reproduction were taken by a Japanese photographer, and show that the natives have caught on to the knack of doing good work in that art. The authenticity of the view showing the outside of the exhibition building may be judged by the jinrikishas standing by the sidewalk. The horizontal engine directly behind the pillar near the center of the interior view has upon it the name-plate of the Atlas Engine Works, and the others seem to be of the same make.

The question of an "open door" in ports under Russian influence is one which Mr. Horne says does not trouble him in the least. It would be a blessing if all Chinese ports were as ready for the reception of American machinery as the Russian. The German are practically closed against it, not so much politically, however, as through the commercial prejudices of consumers. In fact, a sale to a German shop in that region is, for most lines of machinery, practically without example in his experience. Occasionally, too, will be encountered an old Englishman who has been at work in the East for forty years, and who will not abandon the old foundry-made style of tools he has been accustomed to buy for shop-made American ones. "Those may answer well enough for light work," he will contend, "but they are no good for heavy work." Yet among the tools Mr. Horne is importing from America and selling are many of heavy types. With the exceptions noted, the East is found to be wide open to American machinery, and the outlook there is excellent.

Mr. Horne is inclined to criticise the plans of the National Association of Manufacturers in proposing to open exhibition rooms for American machinery and other products in Yokohama and Shanghai. As his own earlier enterprises show, this would not be a novelty. About one hundred American manufacturers of machinery and allied lines, he estimates, already have able representation in the Far East, and if the Association not only exhibits American products but offers them for sale, it is exceeding its proper scope and entering extensively into competition with its own members.

It may be added to the notice we gave of Mr. Horne's purchases for the Chinese & Eastern Railway, that he has placed additional orders with Wm. Sellers & Co. and Wais & Roos Punch and Shear Company. Among the tools ordered are planers and punches.

The application of mechanical stokers to marine boilers has long been looked upon as a very desirable thing, and especially so since the development of the modern ocean steamship, which calls for the feeding of sometimes more than 400 tons of fuel every twenty-four hours. Firing a boiler under conditions as are ordinarily found on steamships is not agreeable, and usually the men thus employed soon become worn out. Much of this heavy labor might be obviated if a mechanical stoker could be found which would prove satisfactory. In this connection we note that only recently several experiments along this line were conducted on a large lake steamer of 10,153 tons displacement. The stokers tried were of the under-feed type, the fuel being pushed into the furnace from the hopper by means of a screw conveyor. Eight trials were made, five of them being of six hours' duration. The fuel used was of an inferior quality, yet it is reported that steam was well maintained throughout the trials, smoke was practically absent, save when the fires were being sliced, and the evaporative efficiency shown was excellent, in spite of the fact that the coal was of a poor grade.

The National Association of Manufacturers of the United States has issued a Spanish edition of the "American Trade Index," which contains a classified directory of members of the association, with special reference to the convenience of foreign purchasers. After each name and address there is printed a short statement of the class of articles manufactured by the company indexed, location of branch houses, cable address, etc. This Spanish edition is intended for circulation in countries where that language is spoken. The index contains 425 pages, and is bound in cloth.

As an instance of how politics complicates matters, it may be stated that a recently issued United States patent for a voting machine embraces 359 claims, the greatest number we have ever noticed.

Letters from Practical Men

Engines of Torpedo Boats.

Editor American Machinist:

When reading the remarks upon machinery for torpedo boats and torpedo-boat destroyers in a letter in the September 21 issue of your paper, it occurred to me that there were possibly many who are not familiar with this class of machinery.

AN AMERICAN MACHINERY HOUSE IN JAPAN.

In order to compensate for whatever loss of strength may occur from the use of the smallest possible amount of material in order to reduce weight, this reduction being one of the necessities to obtain a high rate of speed, forged steel columns, well stayed by diagonal braces, are used for the framing of the engines. The bedplates, which are supported by and form part of the engine keelsons, are steel castings and plates, carefully and strongly worked into the framing of the vessel.

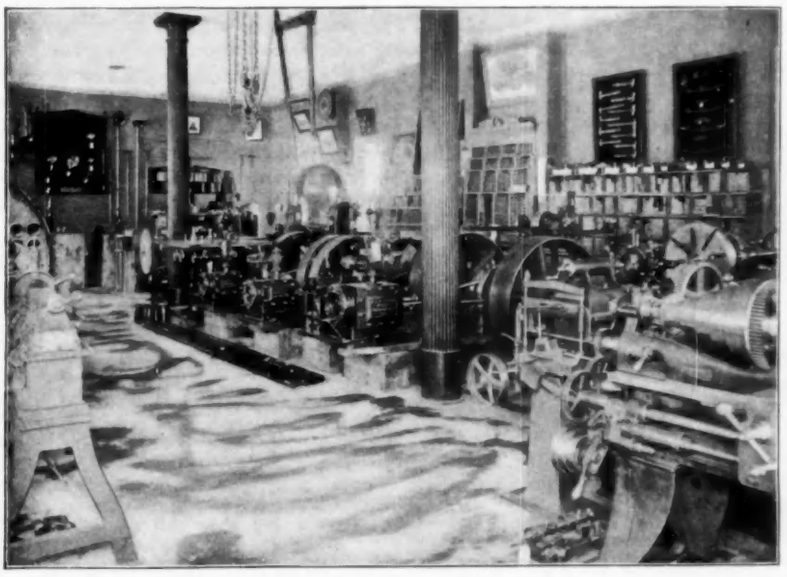
The shafting, piston rods, connecting rods and nearly all working parts are forged from nickel steel, oil tempered and annealed. The forgings must not show less than 95,000 pounds tensile strength, 65,000 pounds elastic limit, or 21 per cent. elongation in 2 inches, and the bending specimen must stand cold bending double to an inner diameter of 1 inch without showing cracks or flaws.

The material used in the framing is also of nickel steel, and must show not less than 80,000 pounds tensile strength, 50,000 pounds elastic limit, or 25 per cent. elongation in 2 inches.

The bending specimen must stand cold bending double to an inner diameter of 1 inch without showing cracks or flaws.

All steel castings are required to be of the highest obtainable efficiency, a sufficient number of test pieces being taken to thoroughly exhibit the character of the metal in the entire piece. The weights of the pistons are such as to make the weights of reciprocating parts the same for all cylinders, the weights of the air-pump pistons and moving parts actuating them being taken into consideration. This is required in order to obtain a nearly perfect balancing of the engines.

It seems to me, from the above, that these engines are not so frail and light in construction as one would imagine, and



AN AMERICAN MACHINERY HOUSE IN JAPAN—INTERIOR.

I have never known of an accident on a boat of this kind, but that ones of a similar nature and more destructive could be cited as having occurred in larger craft.

A. H. Nourse.

The Deceptive Fracture of Pig Iron.

Editor American Machinist:

The writer is pleased to note the space given up of late in the "American Machinist" to demonstrate the error of past practices in defining the grade of pig iron, as it will do much good in advancing this reform. He believes he was the first person to write a paper on this subject, which was given to the American Society of Mechanical Engineers in 1895. The necessity of advocating the benefits to be derived by abandoning the old practice of judging pig iron by fracture and adopting chemical analyses was a factor which largely influenced the writer to bring out his work, "Metallurgy of Cast Iron" in 1897, which work shows the effect which one metalloid has upon another in changing the grade of iron and how to be guided by chemical analyses in making mixtures. While at the present day about one-half of our foundries are guided by chemical analyses in making their mixtures or judging the grade of pig iron, there are still many who are stubborn in the belief that they can tell what pig iron is by the appearance of its fracture, and to convince them of their error may often call for experience that will forcibly awaken them to concede the truth. To illustrate how one of the old-school faith was suddenly made to concede the error of almost a life's practice, in grading pig iron, the following incident is cited:

About three years ago I became party to an argument with an old, experienced blast-furnace manager, upon the impracticability of judging pig iron by fracture. The latter claimed he could tell by fracture what any grade of pig iron was. Remembering a certain furnace nearby that had a large pile of small pieces of pig iron that had been gathered from different grades and analyzed, so that by referring to the records (each piece being marked) one could tell exactly what grade they were, the writer invited the furnaceman (along with a few witnesses) to test his skill in judging pig iron by fracture. Arriving at the pile, pieces were selected for inspection and the furnaceman asked to

state their grades or what kind of a casting each piece would make as regards being soft or hard. As the furnaceman guessed the grade of each piece, it was marked and given a number to correspond with the recorded analysis. When twenty of the pieces had passed inspection, comparisons were made. The recorded analyses showed that the furnaceman "hit it" about six times; or, in other words, had a founder been guided by his judgment, fourteen "heats" out of twenty would have given him unsatisfactory results in his castings, and in half of his "heats" the castings would have been much too hard or soft, and many of them condemned. Now, this furnaceman was like all of us at some time before our change of experience to accept chemical analyses as being the only true guide, in judging the grades of pig iron, and had been started in a line of practice followed by his father or others gone before him. Because they of the past had thought it correct, he allowed himself to go on year after year in their footsteps, and as nothing had ever occurred to force him to accurately test his practice, he only sneered at those claiming he was wrong. The half-hour this furnaceman spent in having his skill tested as related above, forced him to see the error of his past practice, and to-day, if you write him about the grade of iron, he sends you the analyses, saying nothing about the iron being open or close grained and leaves you to judge for yourself what kind of casting the iron should make, from the chemical analyses reported. With the information obtainable at the present day upon the effects that the metalloids, silicon, sulphur, phosphorous, manganese and carbon have in changing the grade of cast iron, a founder is a very back number who will turn upon a furnaceman and blame him for any ill results he might obtain in making the desired mixtures of iron.

THOS. D. WEST.

Sharpesville, Pa.

Rig for Turning Piston Rings.

Editor American Machinist:

The rings which this rig was made for turning were required to be eccentric, or thicker at the side opposite the cut, and they were turned to fit the bore of the cylinder after being cut and sprung together, which accounts for the necessity of the special devices. The rings are designed to be one-quarter thicker at the back than at the open ends. The casting from which the rings are to be made is bolted to the faceplate, bored the proper size, then set over with the correct eccentricity, and the outside is then turned to the diameter given in the fourth column of the table. The rings are then cut off to the required width, when they are ready to be cut out at the thinnest side, the amount cut out being also given in the table, last column.

In Fig. 1 we have a stepped faceplate with each step turned a little smaller than the finished diameter of the rings to be turned on it. This faceplate is cast with suitable stiffening ribs on the back, is screwed to the spindle, and the steps are faced and turned in position. The stud *S* is screwed into the front of the faceplate, and is turned true to fit the bore of follower *P*, and threaded on the outer end for the nut *R*. The clamping ring, with bolt lugs as shown, Fig. 2, is split, and can be drawn together by the bolt *L* until the opening is closed, when it should be bored to fit follower *P*. When the rings have been cut out they are sprung together and pressed into the clamping ring; the follower is slipped in and all placed on stud *S* and tightened by the nut *R*.

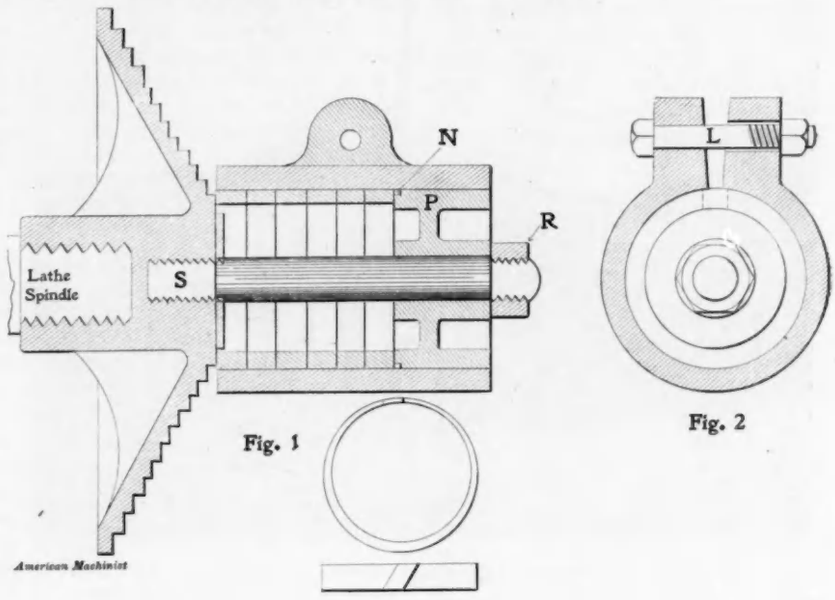


Fig. 1 Fig. 2

RIG FOR TURNING PISTON RINGS.

No.	Size.	Bore.	Diam.	Width.	Set Over	Cut Out.
	In.	In.	In.	In.	In.	In.
1	4	$3\frac{17}{18}$	$4\frac{7}{16}$	$\frac{1}{2}$	$\frac{1}{32}$	$\frac{3}{8}$
2	5	$4\frac{1}{2}$	$5\frac{7}{16}$	$\frac{9}{16}$	$\frac{1}{32}$	$\frac{3}{8}$
3	6	$5\frac{1}{2}$	$6\frac{7}{16}$	$\frac{5}{8}$	$\frac{1}{32}$	$\frac{3}{8}$
4	7	$6\frac{1}{2}$	$7\frac{7}{16}$	$\frac{5}{8}$	$\frac{1}{32}$	$\frac{3}{8}$
5	8	$7\frac{7}{16}$	$8\frac{7}{16}$	$\frac{3}{4}$	$\frac{1}{32}$	$\frac{3}{8}$
6	9	$8\frac{7}{16}$	$9\frac{7}{16}$	$\frac{3}{4}$	$\frac{1}{32}$	$\frac{3}{8}$
7	10	$9\frac{3}{8}$	$10\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{64}$	$\frac{1}{2}$
8	11	$10\frac{3}{8}$	$11\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{64}$	$\frac{1}{2}$
9	12	$11\frac{3}{8}$	$12\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{64}$	$\frac{1}{2}$
10	13	$12\frac{5}{16}$	$13\frac{1}{2}$	$\frac{7}{8}$	$\frac{3}{64}$	$\frac{1}{2}$
11	14	$13\frac{5}{16}$	$14\frac{1}{16}$	$\frac{7}{8}$	$\frac{1}{16}$	$\frac{5}{8}$
12	15	$14\frac{5}{16}$	$15\frac{1}{16}$	1	$\frac{1}{16}$	$\frac{5}{8}$

TABLE FOR TURNING PISTON RINGS.

When this nut is screwed up tight it binds all the rings edgewise and holds them securely. The clamping ring is then slackened and removed, when the rings may be finished to the required diameter. As the finished diameter of the rings is less than the diameter of the follower, the inner corner of it is cut away at *N* to clear the tool. The steps of the faceplate also should be wide enough for the tool to travel over with safety and without cutting into the face of the next step. Six rings may be readily finished at one setting. Each size of ring requires its own clamping ring and follower. Rings of this style, and made in this way, are being exclusively used by a gas engine builder, with excellent success.

PETER SCHELLENBACH.

Anderson, Ind.

Machine Shop Notes.

Editor American Machinist:

Having a great many rough cast-iron gears and pulleys to bore, twenty-five were done in a lathe, twenty-five on an upright drill and twenty-five were punched or broached on an ordinary drill press, by means of the punch shown in Fig. 1. The cost was shown to be greatest for the lathe, about two-fifths less for the drill, and four-fifths less for broaching. As shown in Fig. 1, the broach is serrated, so that half the metal is removed from the hole in chips by the first set of teeth *A*, the rest being removed by the second, *B*, the two rows of teeth slightly overlapping each other and producing quite a smooth hole. As may be seen, the action of the tool is that of cutting, while a punching action would cause the metal to break out in spots and nullify the usefulness of the process. The cost of making the broach is somewhat high, and its upkeep is expensive, but that is more than offset by the speed at which the holes can be finished and the cheap grade of labor employed. To hold the casting a form with an eccentric lever is substituted for the usual die, and the bearing for the castings is simply cast iron. Cored holes about $\frac{5}{8}$ inch in diameter were rough finished $\frac{3}{4}$ inch in diameter for 25 cents per hundred, with a cost for tool and upkeep of 70 cents

per hundred. The finish of such holes is about equal to that made by drilling, and a smoother hole (equal to reaming) can be made by placing above the serrated broach a round one which has a scraping cut.*

* * * * * *

A novel sprocket chain tightener, which for cheapness and simplicity seems hardly

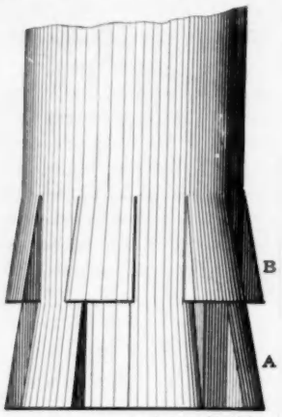


Fig. 1

A BROACH FOR ROUND HOLES.

to be excelled, has been devised by Superintendent Johnson, of the Chicago Automatic Flue Scraper Company. As may be readily seen, its field of usefulness is limited, for the reason that one of the working sprockets must necessarily be larger than the other. *A* and *B*, Fig. 2, are the working sprockets, and *C* is the tightener, which is simply a sprocket rim without hub or arms. When the chain is first put in place, the idler *C* occupies a position near the larger wheel *B*, as shown, and as the chain lengthens from

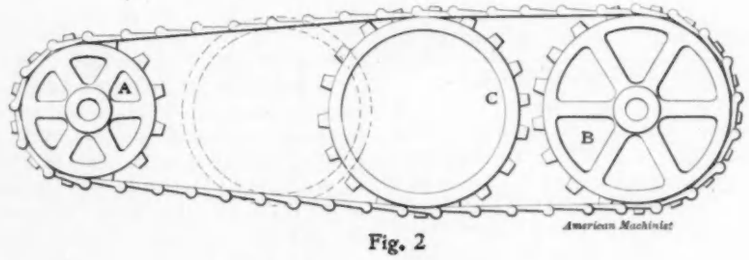


Fig. 2

DEVICE FOR TAKING UP THE SLACK OF A CHAIN.

wear the wheel is moved toward *A*, until it reaches the position shown by the dotted circle, when the chain is disconnected, one or more links are removed, the idler *C* again placed near to *B* and the chain rejoined. No bearings or supports of any kind are required to keep *C* in place, as it will remain where it is put until the chain from wear becomes so slack as to let it fall out.

* * * * * *

While at the factory of the Otis Elevator Company, the superintendent showed me a piece of ¾-inch steel plate in which was a punch hole ⅜ inch in diameter, which was very smooth (looked like it was done by a drill) for about three-quarters of its length, the metal tearing away but little for the rest of the distance. This is not regular work, however, but punching ⅜-inch holes in ½-inch stock is their usual practice, and the average life of such a punch is 200 holes, when properly hardened. The hardening is done by the usual method.

* * * * * *

While many persons of experience can identify metals by looking at their fractured ends, the ability to distinguish between different makes of tool steel of the same grade by similar means is rare—if it exists at all—though many people believe and claim they possess it. I have in many instances removed the original labels from bars of tool steel and substituted others, then pretending to hold my hand over the labels, but permitting them to be partly seen, I have asked persons who considered themselves judges to select a certain make, and have invariably found that they were guided by the labels. The process of hardening will, to a certain extent, act as a "negative" guide, for where one steel will act properly under a certain treatment, others will be ruined by similar handling. I have been acquainted with many tool dressers who were past masters in their art when using a certain make of steel, but who were miserable failures if the steel was changed on them, a thing which is frequently done by the purchasing agents when they find they can get another grade, "equally good," for a few cents less per pound, but which is dear at any price if the tool dresser can't handle it. If a change in tool steel is desired, under circumstances as described, the most satisfactory way is to have a competent man come from the manufacturers of the supplanting tool steel and instruct the tool dresser in the proper way to handle it, and, failing this, the only thing to do is to change tool dressers when the make of tool steel is changed.

J. B. HALL.

[And run the chances of getting a new man who can successfully handle no kind of steel whatever.—Ed.]

* We illustrated and described a tool for this purpose in our issue of January 31, 1889.—Ed.

English Pipe Threads—Habits of English Workmen—English Co-operative Societies.

Editor American Machinist:

On looking into the matter of the answer to "C. M.," Schenectady, N. Y., concerning English pipe threads, I think your statement will be found somewhat incorrect as regards the number of threads per inch in the different sizes of pipe. I find in practice the pitch of pipe threads to be as follows: ⅛ inch (bore), 26 or 28 threads—both pitches being in use; ¼ and ⅜ inch, 19 threads; ½ and ¾ inch, 14 threads, and 1 inch and over, 11 threads. It is quite possible that English hydraulic pipe is screwed 8 threads per inch in the larger sizes, but I think the above list will be found to agree with English practice. By the way, the change wheels on many American lathes do not provide for cutting 19 threads to the inch, a special wheel having generally to be cut for this purpose. American pump makers might save trouble over here if they omitted loose screwed flanges on pumps designed for English use, as the American flanges are of no use here, owing to the difference in the threads.

I sympathize with Mr. Tecumseh Swift's protest against the savings-bank or home-owning test of a man's success in life. Most books on "Thrift" which I have seen have tended to make unduly prominent the hoarding rather than the wise expenditure side of the subject. The man who by carefully thought out *expenditure* of his income has provided for himself and family an environment conducive to the living of a full and well-balanced life has, to my mind, more of the "hero" in his composition than the typical, pure and simple hoarder, however praiseworthy the motive for hoarding. One definition of thrift that I have seen is "making the best use of everything," another is "good management." Parsimony—too often considered identical with thrift—seldom tends to fulfill either of the above definitions.

I must also indorse the letter of an "English Worker," and protest against the person mentioned by Mr. Morris Fulton being held up as a sample of British workmen as a body. One might, with equal justice, take the riotous street railway strikers of Cleveland, who, before the strike had lasted a week or two, commenced destroying railway property and jeopardizing, if not taking, human life, as samples of average American citizens. As a matter of fact, I have noticed that the contrast between the self-restraint and endurance of the British workman, as shown in the engineering dispute of 1897-8, which lasted more than a year, and the utter lack of these qualities in many American labor disputes, is very marked. It is also rather curious that Europeans generally hear of American disputes from the newspapers, American technical jour-

nals appearing to more or less ignore such occurrences, thus tending, I think, to give some of our magazine writers (or shall we say Jeremiahs?) the idea that labor troubles are unknown in the States.

As one example of the enterprise, business capacity and social ambition of the British workman might I mention the English and Scottish co-operative wholesale societies? These are principally distributive societies, supplying local co-operative stores with provisions, clothing, etc. Their capital runs well into the millions—pounds, not dollars. They have boot and shoe works, woolen mills, furniture manufactories, clothing factories, corn mills, etc., and own and run several steamships, which bring produce direct from the Continent of Europe to their warehouses. Their tea buyer is the largest buyer in the Mincing Lane (London) tea market, and therefore, probably, in the world. This sketch only gives a slight idea of the extent of the operations of these societies, and practically every cent of the capital and property is owned by ordinary workmen. Many of the local societies have educational departments, which provide for members facilities for technical education and elevating social relaxation. Take, for instance, the society at Bolton, Lancashire, a town of about the size and character of Providence, R. I. There about $4,500, or 2½ per cent. of the net profits, is devoted to educational effort. One of the best of technical libraries is open to members and their children, and one consequence is that, to my personal knowledge, many former members are holding responsible positions in the United States, India, Germany, etc. I think the above statement will prove Mr. Fulton mistaken in supposing that the artisan depicted by him is a fair criterion of the average English workman, and no doubt Mr. Fulton will be pleased to be proved in error.

JAMES VOSE.

Manchester, England.

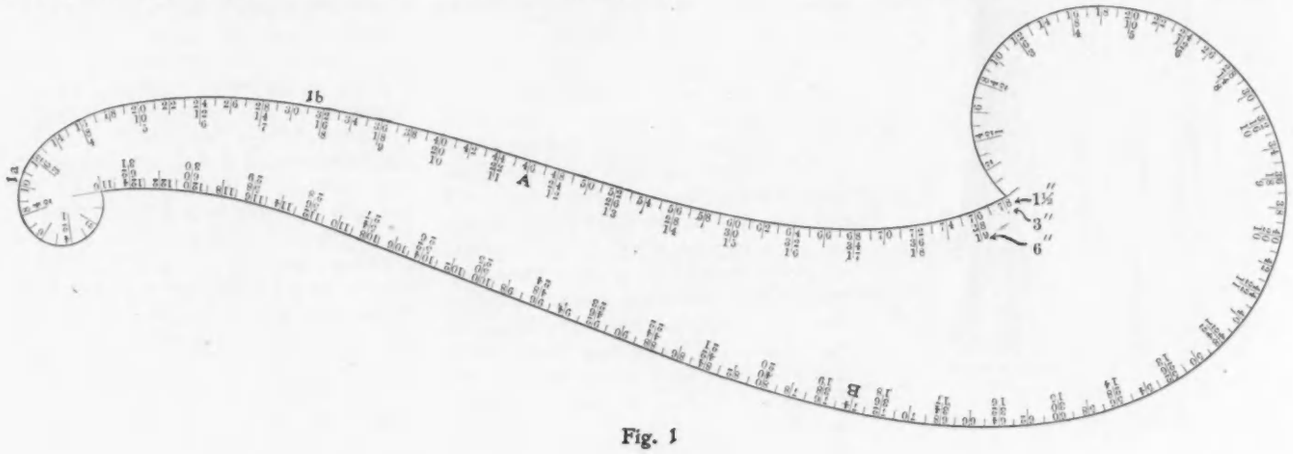


Fig. 1

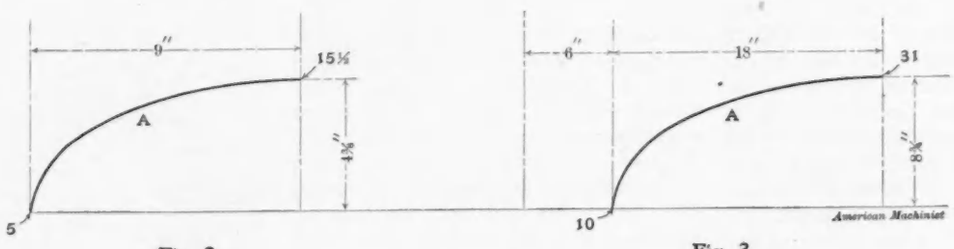


Fig. 2 Fig. 3

A DRAFTSMAN'S CURVE TO CO-OPERATE WITH PATTERN MAKER'S.

Corresponding Curves for Draftsman and Pattern Maker.

Editor American Machinist:

I observe that recently there have been letters in your columns on the reproduction of draftsmen's curves by the pattern maker. I don't claim an acquaintance with curves of great length, such as shipbuilders use, but for ordinary machine design I think the curve that suits the designer best, whether it be circular, irregular, or any shape, should be put there, and I don't see why the pattern maker should be troubled in reproducing such curve. You advise the cross-section method, which is good so far as the reproduction of the curve is concerned; but for the draftsman to draw his curves on cross-section paper, and then for the pattern maker to reproduce them to full size in the same way, I consider too much trouble when there are many different curves to be made, so I have graduated my set of curves as explained below, and have required the pattern maker to have a corresponding set, full size, graduated in inches. It requires some time to make and graduate these curves; but the pattern maker, by their use, will soon save time enough to overbalance the labor in obtaining them.

I have a set of irregular celluloid curves, *A, B, C* and *D*. In the accompanying sketch I only give *A* and *B*, as they are the curves I nearly always use, and they will serve to illustrate my idea. These curves are graduated so that the short spaces, Fig. 1, represent inches to the scale of 1½ inches to the foot. Then two of these spaces, as indicated by the next longer marks of graduation, represent inches to the scale of 3 inches to the foot, and four spaces give the scale of 6 inches to the foot. I therefore have three different scales on each curve. This is done to save the expense of three different curves, and as they are not used so very often the proper care will avoid confusion. My pattern maker has a set of similar full size curves made of hard wood, and they are graduated in inches. The pattern maker must have a curve for each scale used by the draftsman. That is, for a scale of 6 inches to the foot, used by the draftsman, the pattern maker's curve is twice the size of the draftsman's, and the pattern maker's curve, when 3 inches to the foot is used by the draftsman, will be four times the size of the draftsman's curve, and so on with the different scales.

I have found that I can always make my drawing to one of the three scales given above, so with his four curves and

three scales of each curve my pattern maker has twelve curves.

To use these curves the draftsman locates the ends, letters the curves, and shows by the numbers at the ends the portion of the curve used. The drawing goes to the pattern maker, and he locates the ends of the curve on the pattern and uses corresponding curves. as indicated on the drawing, using in each case the portion of the curve used by the draftsman and the curve corresponding to the draftsman's scale.

In Fig. 2 there is shown the portion of curve *A* between 5 and 15½ as used when drawing to the scale of 3 inches to the foot. The same portion of the curve is again used by the draftsman in Fig. 3, but in this case the scale of the drawing is 1½ inches to the foot, and the length of the actual curve in the pattern would be twice as great as that in Fig. 2, and its ends would therefore be indicated by 10 and 31, instead of by 5 and 15½, as in Fig. 2. And in this case the pattern maker would use that portion of curve *A* from 10 to 31, scale 1½ inches to the foot, as designated by the draftsman, while in the former case he would use curve *A*, 5 to 15½, scale 3 inches to the foot, as indicated by the draftsman.

With a set of these curves the pattern maker has no more trouble in drawing his curves than does the draftsman. Again, these curves get the draftsman out of the idea that every curve must be the arc of a circle, thus eliminating the trouble with circles of large radii, which are just about as hard to reproduce as the irregular curves.

J. I. BLOUNT.

Ensley, Ala.

A Combination Die.

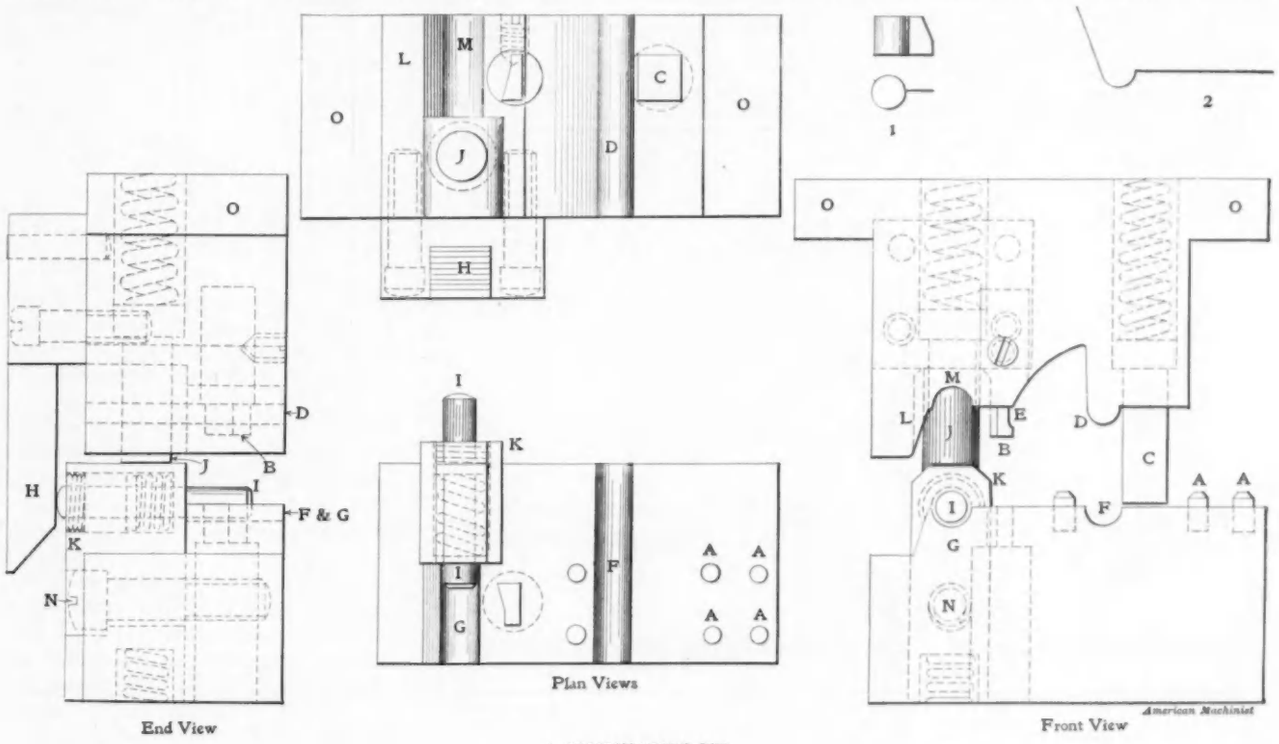
Editor American Machinist:

This die is what our friend Mr. George B. Painter would probably style a "follow" die. It is used to bend up and cut off the piece shown at 1. This is of semi-hard copper, .007 inch in thickness, ¼ inch in width, and with a diameter of 7-32 inch for the inside of the cylindrical part. The tape to make these pieces from is procured in a roll. This roll is supported on some sort of an axis so as to unroll readily, and is fed in by hand to the die between the guide pins *A A;* it is pushed along sufficiently so that the knife or punch *B* will trim the end. The spring pad *C* first catches it and holds it while the end is trimmed, and when the clearance shown at *E* is far enough down to leave the trimmed end free the form *D* catches the tape, and, with form *F*, makes the lower half of the bend, with end enough left with which to make the upper half.

The tape is then helped along and the half bend already made laid into the form *G*. Then on the next down stroke of the press the machine on *H* pushes in the pin *I* over it, and the pad *J*, having a stronger spring, pushes down the pad *K*, pin *I* and all, thus securely holding the tape, while the upper half of the bend is made and the end cut off the proper shape, completing the piece. and at the same time striking a half bend for a new piece on the remaining end of the roll. The office of the extended part *L* is to catch the end of the tape shown in 2 and start it over into the form *M* as the press comes down after the piece has been secured by *I*, *J* and *K*.

In addition, I will say that the spring actuating the pad *C* must not be stiff enough to mar the copper tape. The lug *H* should fall low enough to push the pin *I* in before the pad *J* takes hold. The pad *J* should be long enough to secure the tape before *L* engages with its free end. The punch *B* is formed on a cylindrical shank, and held up in place and kept from turning by a set-screw, as shown, and the clearance at *E* must extend low enough to free the end of the tape before the form *D* touches it. The cutting die corresponding to *B* is worked through from the top to a hole bored in the bottom, within about ¼ inch of the top. The screw *N* serves not only to hold pad *K* in place, but also to limit its upward motion. The lugs on the upper die *O O* are used to screw and dowel through into a punch holder, and the lower die can be held in any one of a multitude of ways. The projection of the pad *C* and its spring is omitted in the end view for the sake of clearness, but would appear in dotted lines behind the punch *B*.

H. E. HARRIS.



A COMBINATION DIE.

Boring an Eighteen-Foot Propeller Wheel in a Fifty-six-Inch Lathe.

Editor American Machinist:

In the days of the old, slow-speed, single-cylinder condensing engines some large propeller wheels had to be bored in comparatively small shops, and we had to resort to such means as would suggest themselves. To bore a 17-inch hole in a wheel that weighs 12 to 20 tons, the blades reaching 9 feet from the center, is not a very easy job, in a jobbing shop, until it

has been once accomplished. In the case that I am to tell about, it seemed to strike us that we could do it in our 56-inch lathe.

The boss sent it in to us to bore, and there was the lathe. Well, we did it, and the way we did it is shown in the sketch. In the first place, we built the taper boring arrangement shown in Figs. 1 and 2. In Fig. 1 we have a long cast-iron frame with a sliding head *B*, with a tool bolted in, marked *a*. On one end is shown a hardened steel swivel center *C*. This was made so that it could be adjusted for any angle called for by the offset on the other end. To accommodate both large and small bores in the wheels, we had two of these centers fitted, so that we would not have to project the tool so far. For feeding the sliding head *B*, we fitted the long screw with a star *F*, coming in contact with the small feed bracket *K*, in Fig. 3. To get the right taper, we fitted a steel slide *D* with centers reamed as shown. If the centers in this slide would not give us the exact taper we could slip under the jig end at *U* some pieces of tin, and held fast by the bolt *E*. In boring a taper hole, it is almost impossible to hit the taper the first time. Hence this precaution.

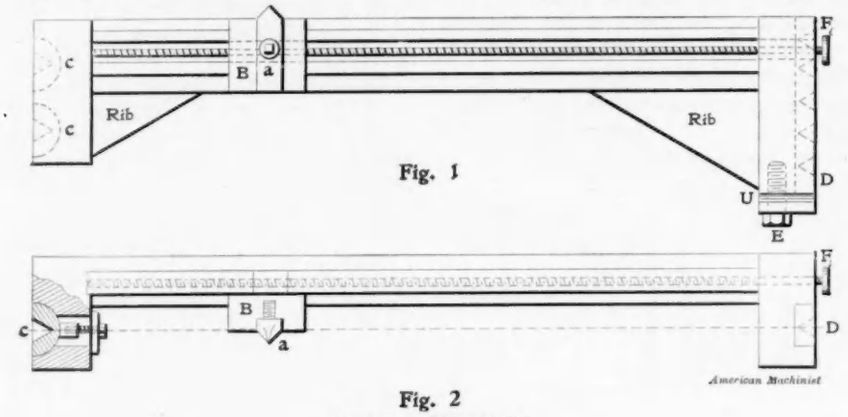


Fig. 1

Fig. 2

BAR FOR TAPER BORING.

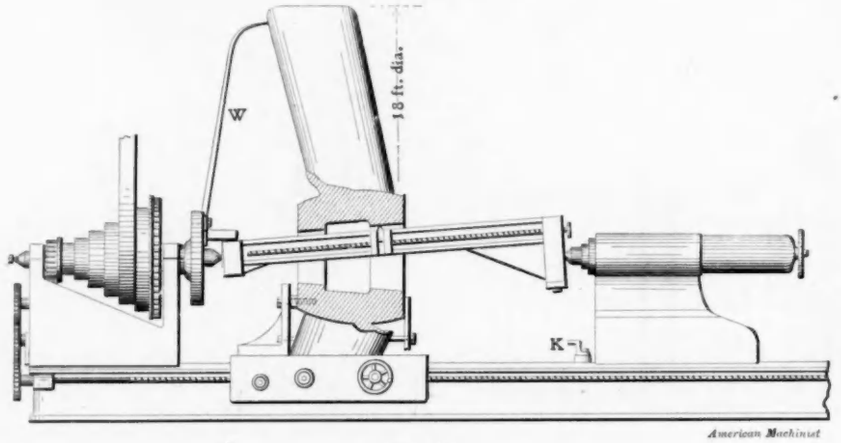


Fig. 3

BORING LARGE PROPELLER WHEEL.

In setting the wheel, we placed two of the blades in a straddle position over the bed and carriage, and with some heavy angle plates, clamped with bolts, we set and secured it in a very firm manner for boring. In order to set it true, by the tips of the blades, we used a wire rod tram *W* clamped to the lathe face plate. This answered every purpose and gave us a very true job. The fit in a large propeller must be good, in order to have it remain tight on the shaft when in service. To get the fit before removing the wheel from its setting, we had a sheet-iron templet made, and by hauling back the lathe tail stock and removing the bar we could try the templet in. To square up the ends of the hub we put in a different shaped tool, made with cutting edge on the side, and cut a narrow surface all around the bore. This gave us a surface to work from, in squaring all the way across. To do this, we fitted a cast-iron bushing in each end of the bore, about 3 inches thick, turned taper on the outside. We removed the boring bar and drove in the bushing, through which we bored a 6-inch hole. With the wheel still clamped to the lathe carriage we fitted a 6-inch bar through these two bushings, and, with the bar on the lathe centers, we could use a facing arm by removing the clamping on one side at a time; the bushings holding the wheel in place until the clamps could be reset. This style of bar may be used to bore other work in a lathe as well as propeller wheels, or straight holes may be bored by adjusting the centers.

H. S. Brown.

Approximate Construction of an Ellipse.

Editor American Machinist:

In view of what has recently appeared in the "American Machinist" with regard to methods of approximating to an ellipse by arcs of circles, and also on machine sketching, the following may be of interest. Probably it is old, but I have never seen it described elsewhere.

The usual condition which arises in drawing is that the major and minor axes are given; the major, of course, being the diameter of the circle, of which the ellipse is the skew projection.

Fig. 1 indicates the construction:

Let major axis be *A O C*.

Let minor axis be *B O D*.

Let half major axis $= r$.

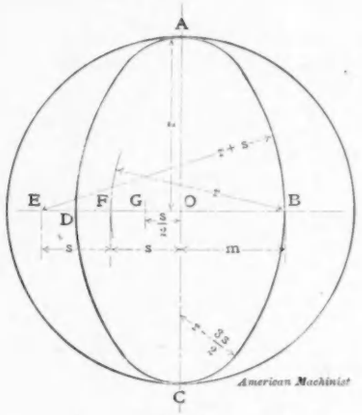


Fig. 1

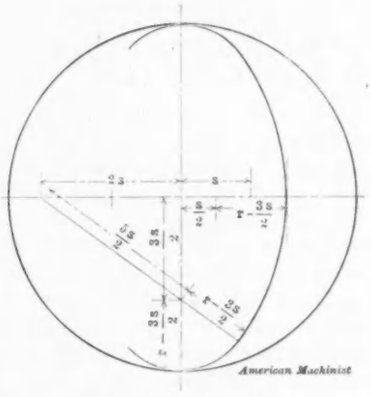


Fig. 2

APPROXIMATE CONSTRUCTION OF AN ELLIPSE.

Let half minor axis $= m$.

$$r - m = s.$$

From center *B* and radius *r* describe an arc cutting *B D* at *F*.

$$O F = s.$$

Set off *F E* equal to *O F*.

E is the center from which to describe the side of the approximate ellipse with radius $r + s$.

Bisect *O F* in *G*.

D G will give the radius for the corres-

ponding end curves of ellipse (i. e., $r - \frac{3}{2}s$).

That this is true in every case will be seen by reference to Fig. 2, where the lengths of the various lines are shown algebraically. F. O. HUNT.

Manchester England.

Holding Wires for Cutting off—Card Index for Customers' Patterns.

Editor American Machinist:

Noticing in your issue of October 26 the description of a rig for holding rods to be cut up reminds me of the trouble encountered when undertaking a similar line of work, which leads me to question if sufficient pressure could be exerted on the rods, to prevent them from rolling, by means of the cam levers shown in your illustration of the rig. It is my experience that unless the rods are rigidly held, they will turn as soon as the saw or mill commences to operate upon them, and I do not see how this can be prevented in the rig described.

With reference to the card index for patterns alluded to in the same issue I would say that I am connected with the other side; that is, furnishing castings from patterns sent us, and it might interest your readers to know what record is kept of customers' patterns after they are received by the foundry. I enclose one of our cards, which you are at liberty to reproduce. Our arrangement does not result in the accumulation of cards that the single card to a pattern idea produces, and which in our business would be a great number, some of our customers carrying as many as 300 patterns with us. Furthermore, it is not always desirable to remove a card as soon as a pattern is returned, for there may be an order sent in for castings from that same pattern; for instance, we have lately had an order from a pattern that was sent back nearly two years ago. And after a while, should you know of any patterns being destroyed by the owners, the remainder can readily be copied on to a new card if wanted. These cards are 8½x4 inches, and have the usual hole near the bottom at the middle for the retaining rod. S.

Shelf 36

Sec. A

SMITH JONES CO.

PATTERN	No.	Price Per Mould	Gates Per Mould	Patterns Per Mould: Brass	White Metal	Iron	Wood	Cores Per 100	Core Boxes: No. a M'ld	B	I	W	Returned	Weight Per Mould	Size of Flask	Patterns Made	Charged For	Date of Order	Gates sent
Gear Blank spoked 15"dia.	55	10	1			1								15					2 pat
Cap	1001	04	1		4			25	4		1			2		4 WM	10/1/99		1 pat w
Columns	3	18	1			1		5.00	1			1							
Base	6	09	1			1							12/98						

American Machinist

RECORD OF CUSTOMERS' PATTERNS.

An Improvised Upsetting Rig.

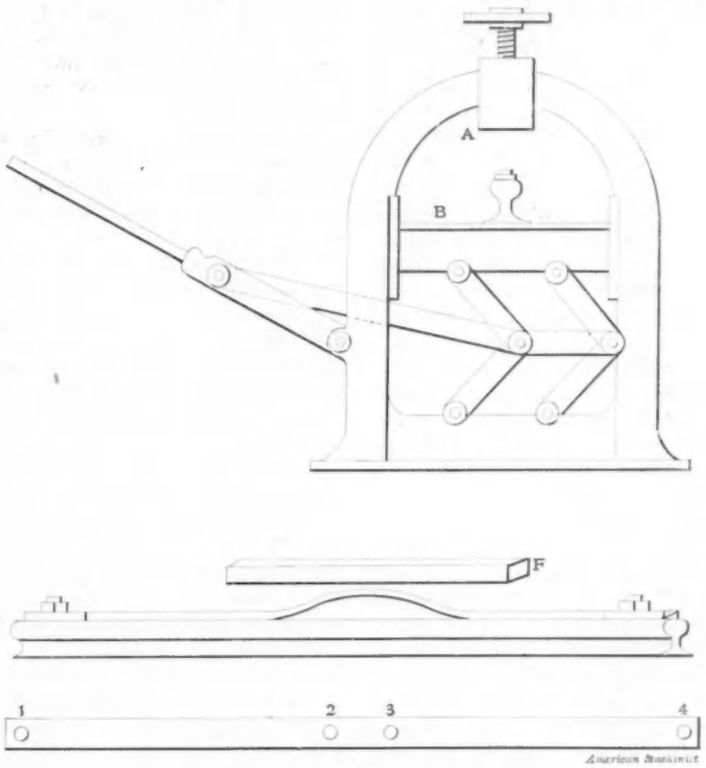
Editor American Machinist:

This is the first time I have attempted to say something through your valuable paper, which I have been reading with interest for a number of years past. What pleases me most is to see a clever trick carried out and the surmounting of the difficulties so often encountered in our art.

I unexpectedly tumbled on to a job while in charge of the repair gang of a firebrick concern. Fifty brick cars arrived from a Western iron works in a knock-down condition. In putting them together we discovered that a certain dimension did not correspond with the blueprint sent, but it developed that our smart manager had some long-distance telephone talk about the building of the cars, of which, of course, there was no record. The manufacturer of the cars blamed our manager for saying "all right." And, of course, the latter didn't want to know anything about it.

Well, here it was, besides an enormous lot of general repair work, here came that job of 400 bars of flat iron, 1½ x ⅜ inch, and all too long. The bottom of the sketch shows the same, with four holes in the bar. The bars had to be shortened between holes 1 and 2, and between 3 and 4 about 5-16 inch. To set holes 1 and 4 in nearer would not make a good job. It would produce an oblong hole; and even the punching of a new hole alongside of one already existing is hard on a punch.

My idea was to upset the bars; that is, to shove in the ends of the bars. In looking around the place for something suitable to do the work, I hit upon a brick press, as shown in the sketch, operated on the toggle joint principle, where a table is raised in guides, and the top of the frame has an adjusting arrangement needed for



American Machinist

AN IMPROVISED UPSETTING PRESS.

the various dimensions used in brick dies. I found room enough between that part of the press marked *A* and the face of the table marked *B* to put in a piece of 80-pound rail, provided at each end with stops, as indicated in sketch. The bar to be upset was bent as much as was required and a piece of square iron laid on top of it to prevent the buckling at other points. And you just ought to see how nice and quick the work was done. With four irons in the fire, the smith brought them quite lively, and with his helper at the lever it worked like a charm. I am sorry to say that the week following this performance I got the bounce from our smart manager. R. BETTERMANN.

The Secor Oil Engine.

Editor American Machinist:

As Mr. Dolnar appears to have misunderstood my remark that the architecture of the Secor engine could be forgiven its inventor if the system of cold atomization used therein was really a success, it seems proper to say that I had no thought of casting doubt on his statement *per se*, but merely of suspending judgment until further evidence was at hand. It is well enough to see an engine run, and there are other engines which feed liquid kerosene into the cylinders; but the test of the brake (facts, not claims) and the test of time must come before the merits of such a device can be accepted as fully established.

Concerning the general design of the engine, it seems hardly necessary to say anything further. The public is quite able to judge for itself regarding the points involved, and it is extremely probable that it will do so without regard to what I or anyone else may say. If we are to be convinced that the engine is not too light, why not give its weight complete? The flywheels are "awkward," of course, on upper shop floors, where either the engine must be mounted on a sub-base or the flooring must be cut away to make room for them.

In his surmise that I am "interested in internal combustion motors," Mr. Dolnar is not far from the truth; but if he had taken the trouble to read the articles of mine to which he alludes he might have thought the conjecture superfluous. Since, apparently, he did not, however, I must explain that I did not say, and certainly had no intention of saying, that such motors cannot be balanced. If he refers only to balancing the inertia forces, two different methods of neutralizing these are there mentioned; and if we were not restricted by the necessarily low shaft center, there would be hardly a limit to the other arrangements possible. If he refers to neutralizing the torque reaction, that is another matter altogether, and one which has often been attempted, but never successfully achieved in boats. It is perfectly easy to show "by figures" how it could be done, but the question is not of getting something to run on paper, but of finding an engine that will meet commercial conditions. Indeed, but one complete, correct and practical solution of the general problem has yet come to my notice, and this was not applicable to boats. If Mr. Dolnar knows how to solve it in a boat engine, by all means let us hear from him.

Reading, Pa. HERBERT L. TOWLE.

Editor American Machinist:

The description of the Secor motor, by Mr. Hugh Dolnar, contained in your issue of October 5, has attracted considerable attention in the engineering press and also among engineers.

The "American Machinist" for October 26 prints a communication from Mr. Herbert L. Towle, entitled "The Secor Kerosene Engine," which is so entirely misleading in its inferences that I am compelled to ask your permission to make a brief reply.

The greater part of Mr. Towle's note is devoted to a discussion of the question, whether "the marine type of engine design is quite as suitable for stationary use as the regular horizontal form." Mr. Towle thinks that by the adoption of the marine type the Secor engine is placed among "a rather small minority." This statement would be true if he had referred only to internal-combustion engines. As a matter of fact, no other gas or oil engine has adopted the purely marine type. But Mr. Towle makes no such limitation. He objects to the use of the marine type for stationary use on the grounds of greater cost and greater liability to excessive vibration.

His contention is, in brief, that while it costs more, for practical purposes it is worth less, and he thinks that most "builders of stationary engines would subscribe to this view."

To this general statement I reply, that I do not think that such firms as McIntosh & Seymour, or the Nordberg Manufacturing Company, or the E. P. Allis Company, or the Westinghouse Machine Company would subscribe to it at all. Confining ourselves for the moment to a consideration of the latest and best practice in the installation of first-class plants, for such purposes as the production of electric light and power, pumping engines for our largest cities, high-efficiency air-compressing plants and stationary engines for general manufacturing purposes, we find that the horizontal engine is being superseded by the more costly but efficient marine type. The most important street railway in Great Britain, the Dublin United Tramways Company, has just installed an enormous plant consisting of six 500-kilowatt units, the engines being of the modified upright marine type. San Francisco, Cal., has just installed a plant of four 400-kilowatt units, also of the upright marine type. New York City has a 1,500 horse-power engine, built by the E. P. Allis Company, for air compression, of the same general style as their latest pumping engines. The great pumping engines of the Cleveland Water Works erected this year by the same firm, are of the purely marine type. This is also true of the large pumping engines now being erected at Pittsburgh by the Pennsylvania Water Company. In fact, the present practice in engineering of using the same type for both stationary and marine use is similar to the condition in the beginning of the present century, when nearly all marine engines adopted the stationary type of "walking beam" engine.

The present upright marine engine represents a gradual evolution, and is simply a case of the "survial of the fittest." In this connection I might add that the best European practice agrees with the best American practice in the adoption of this type for important installations.

I will now endeavor to briefly state the reason which led to the adoption of the marine type in the Secor; and as I have no wish to make invidious comparisons with the work of other able pioneers in this line, I prefer to quote the language of Dugald Clerk—himself a gas engine builder—in his well-known work on "Gas and Oil Engines," which is in the hands of every student of this subject. Comparing the steam engine with the gas engine, he remarks: "As a piece of mechanism, the steam engine is almost perfect," etc., while "the gas engine is a comparatively inferior machine."

It is well known that heretofore the internal-combustion engine has carefully avoided following steam-engine practice. Mechanically, however, the problem is precisely the same in either case, viz., the conversion of reciprocating into roatory motion as the result of an expansive gas acting upon a piston.

In addition to the extra expense attaching to the marine form, Mr. Towle supposes that the lack of weight must be accompanied by a marked increase in vibration. If this contention were well founded it would indeed be a serious objection to the use of the marine form. It is proper to state right here that internal-combustion engines, for evident reasons, are more subject to extreme vibration, and also to undue fluctuation of rotative speed, than steam engines. The pig-iron method of suppressing these vibrations and fluctuations has now been fully tested and found inadequate. Even such enormous weights as 600 or 700 pounds per indicated horsepower, distributed carefully in engine frame and flywheels, have required supplementing by adding heavy flywheels to dynamos when used for electric purposes. So far as fluctuation is concerned, the light marine type Secor is now running a dynamo with a variation of potential of less than one volt, and no flywheel on the dynamo. The absence of vibration is equally marked. This result is obtained without "patching," by the perfectly legiti-

mate means of careful balancing, avoiding "hit and miss" governing, correct timing of ignition, so as to obtain the effect of "lead" in steam engines; proportioning of mixture so as to obtain the result shown in indicator card, and, finally, in adopting the same careful workmanship and design that would be expected in a high-grade Corliss steam engine.

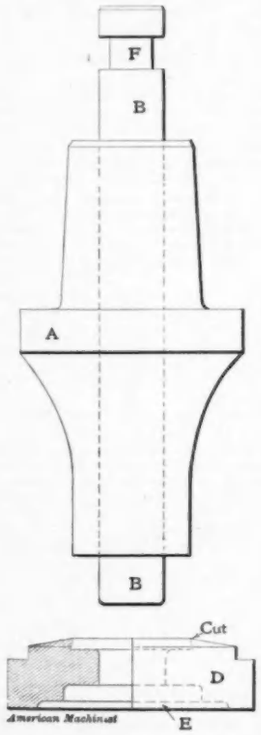
In view of the very great advance in the cost of pig iron, I have reason to believe that the saving in weight which has resulted from the adoption of the marine design in the Secor—a saving of metal of about 400 pounds per horse-power—will very nearly compensate for the better class of work and the more expensive steel forgings. It is perhaps proper to add that the Secor motor is expected to cover the entire range of ordinary power plants, and was not especially designed for small motors.

I will not trespass on your space to refer to the thermodynamic method of the Secor, as Mr. Towle raises no controversy on this point, but on the contrary gives full credit both to the value and novelty of the Secor combination, which he is kind enough to state has "not heretofore been practically applied."

JOHN A. SECOR.

Die Making — Blanking and Drawing Tools.

The accompanying engraving was inadvertently omitted from the letter of Mr. Candrian which was printed last week under the above title. We repeat the descriptive portion of Mr. Candrian's article, as follows:



A PUNCH AND DIE FOR DRAWING CYLINDRICAL SHELLS FROM SHEET METAL.

A is the "outside" or blanking punch, *B* is the "inside" or drawing punch, and *D* is a half-sectional view of the die. In making these tools we use first quality tool steel (Crescent). The punch *A* is left soft, so that as it loses its size it can be upset and refitted into the die. The shank of the punch *A*, slightly tapering, is made to fit the punch holder of the press, and is held there by a strong set screw entering a flat spot filed on the shank. The drawing punch *B* is hardened and ground, and is held in the gate of the press by a "yoke" key at the shoulder *F*. The die *D* is "crowned" off on the top, which is done only to facilitate the operation of grinding the cutting edge, which gets dull from constant use. The bottom or bearing surface of the die is recessed at *E*, which serves as a convenient place to mark the number of the tools. The die *D* should be hardened, ground and drawn to a light straw color. The inside or drawing part of the die should also be carefully lapped to size. The die is held in the die bed by means of a die holder plate, which holds it securely in place at the shoulder *S*. In making these tools we first make the punch *B*, then the punch *A*, and lastly the die *D*.

Annual Meeting of the American Society of Mechanical Engineers — Programme of the Meeting.

The annual meeting of the above named society will be held at its house, 12 West Thirty-first street, New York City, on December 5 to 8, inclusive. The following is the programme of the meeting:

On Tuesday evening, December 5, the president of the society, Rear Admiral George W. Melville, will deliver the annual address, the subject of which is not announced.

On Wednesday morning will occur the annual business meeting of the society, the principal events at which will be the Reports of Council, of Tellers, of Finance and Library Committees, of Professional Committee on Revision of the 1885 Code of Conduct of Boiler Trials. Discussion of this report by the members is expected. The reading and discussion of professional papers will then be taken up as follows:

Wednesday Morning.—"The Steam Engine at the End of the Nineteenth Century," by R. H. Thurston; "Berthier Method of Coal Calorimetry," by C. V. Kerr; "Test of Two Pumping Engines at St. Louis Water Works," by J. A. Laird; "New Graphic Method of Constructing the Entropy-Temperature Diagram of a Gas or Oil Engine," by H. T. Eddy; "Pressure in Pipe Due to Stoppage of Flowing Liquid," by George M. Peek.

Wednesday Evening.—"Liquefaction of Gases," by A. L. Rice; "Curved Glass Blueprint Machine," by P. M. Chamberlain; "A Metal Dynagraph," by P. M. Chamberlain; "Education of Machinists, Foremen and Mechanical Engineers," by M. P. Higgins.

Thursday Morning.—"Experiment on Using Gasoline Gas for Boiler Heating," by Herman Poole; "Friction of Steam Packings," by C. H. Benjamin; "Friction Tests of a Locomotive Slide Valve," by F. C. Wagner; "Note on Flywheel Design," by A. J. Frith; "A Broken Flywheel, and How It Was Repaired," by James McBride; "Efficiency Test of a 125 Horse-Power Gas Engine," by C. H. Robertson; "Strength of Steel Balls," by J. F. W. Harris; "Colors of Heated Steel at Different Temperatures," by M. White and F. W. Taylor.

Friday Morning.—"Impact," by W. J. Keep; "The Southern Terminal at Boston," by H. J. Conant; "High Hydrostatic Pressures, and Their Application to Compressing Liquids; a New Form of Pressure Gage," by F. H. Stillman; "The Value of a Horse-Power," by G. I. Rockwood.

No afternoon sessions are held. On Thursday afternoon such members as choose to will inspect the power plant of the Waldorf-Astoria Hotel, under the guidance of Mr. Chas. R. Pratt. On Thursday evening there will be a reception of members and guests by the president and president-elect at Sherry's, Forty-fourth Street and Fifth avenue, with supper from 10 to 12 and dancing during the evening. Luncheon will be served at the society house on Tuesday evening, and at the conclusion of the morning sessions of Wednesday and Thursday.

Meeting of the Society of Naval Architects and Marine Engineers.

The seventh general meeting of the above society, which was held in this city on Thursday and Friday, November 16 and 17, may be considered the most interesting and profitable thus far of the series, the recent war experiences of the navy having furnished much practical information and suggestion, and greatly stimulated the interest in matters with which the society has to do. The president of the society, Clement A. Griscom, was re-elected for the ensuing year, with the following list of officers: First vice-president, W. T. Sampson; vice-presidents, Francis M. Bunce, Charles H. Cramp, Frank L. Fernald, Philip Hichborn, Charles H. Loring, George W. Melville, George W. Quintard, Irving M. Scott and Edwin A. Stevens; secretary and treasurer, Francis T. Bowles.

A most interesting paper, entitled "Suggestions as to Improved Appliances for Launching Ships' Boats," was read by John Hyslop, who said that upon four different occasions he had stood upon ships' decks when it was necessary to launch boats to save life, and on no one of them

was this quickly and effectively carried out. He was a survivor of the sinking of the Mohegan, and of that occurrence he said that "it was most distressing to see 150 men, women and children waiting through ten to fifteen minutes, each elapsed minute narrowing the limit of life to over two-thirds of that number, only one boat being got clear of the ship, and that one in a damaged condition, after efforts faithful, persistent, strenuous—efforts attended in some instances with serious injury to the workers, and ceasing only when workers and passengers were submerged."

A paper upon "Coaling Vessels at Sea" was presented by Spencer Miller. The subject of the paper presented by Engineer-in-Chief Melville was "Causes for the Adoption of Water-Tube Boilers in the United States Navy," and in it he referred especially to the confirmatory experiences at Santiago. "It would have been of the greatest advantage," it was said, "to have had, during the blockade of Santiago, boilers capable of raising steam in less than half an hour. Coal need not have been used to keep all the boilers under steam all the time. The Massachusetts might have shared in the glories of the fight if she had been fitted with water-tube boilers. The Indiana would have kept up with the Oregon and the Texas. The New York would have developed at least three knots more speed, and the navy would have been spared a controversy."

George W. Dickie read a paper on "The Increasing Complications in Warships and How Simpler Arrangements Might Be Adopted." Other papers read at the first session were "The Electric Plants of the Battleships Kearsarge and Kentucky," by Naval Constructor J. J. Woodward; "Beam Formulæ Applied to a Vertically Stiffened Bulkhead," by H. F. Norton; and "Notes on Sheathing the U. S. Steamship Chesapeake," by Naval Constructor Lloyd Bankson. The papers all evoked lively and profitable discussion.

The papers read on Friday were also of great interest. That of Lieut. A. P. Niblack, U. S. N., was upon "Tactical Considerations Involved in Torpedo-Boat Design." Assistant Naval Constructor R. M. Watt, U. S. N., described and discussed "Novelties in Ship Fittings." Chief Constructor Philip Hichborn, U. S. N., presented an important paper on "Designs for the Denver Class, Sheathed Protected Cruisers." This paper was sharply criticised in a paper following, read by Passed Assistant Engineer Walter M. McFarland, in behalf of Chief Engineer Melville. Other papers read at this session were: "System of Work in a Great Lake Shipyard," by W. I. Babcock; "Overhead Cranes, Staging and Riveter Carrying Appliances in the Shipyard," by James Dickie; "Progressive Speed Trials of the U. S. Steamer Manning," by Prof. C. H. Peabody; and "On the Action of the Rudder, with Special Reference to the Motion of the Ship While the Helm is Being Put Over," by Prof. William F. Durand.

At the Friday's session, at which meeting the chair was occupied by Passed Assistant Engineer W. M. MacFarland, Prof. C. H. Peabody read his paper on the "Progressive Speed Trials of the U. S. S. Manning." This paper was intensely mathematical, and the chairman remarked that it was extremely difficult for men engaged in the actual construction of ships to discuss papers of the nature of the one just read. He doubted if more than five men present could discuss it. He then called on Prof. W. F. Durand to say something on the subject. Prof. Durand complied, and afterwards himself read his paper on the "Action of the Rudder, with Special Reference to the Motion of the Ship While the Helm is Being Put Over." This paper, also, was full of mathematics, and after its reading there was a pause on the part of those present, no one apparently being disposed to discuss it. Thereupon the chairman remarked that as Prof. Durand had kindly consented to criticise Prof. Peabody's paper, perhaps Prof. Peabody would have a word to say for his brother professor, whereupon Prof. Peabody rose and commented briefly on the paper of Prof. Durand, and honors were easy.

Personal.

We would like to have the address of Mr. L. Elliott, who wrote us under date of November 12.

Chas. Churchill, of Charles Churchill & Co., London, returned to England per S. S. "Lucania" on the 18th inst., after a stay here of about one month.

A. Otto Diechmann, head of the firm of Gustav Diechmann & Son, Berlin, is here on a business trip, and expects to remain until early in the coming year. He reports the American machinery business very good in Germany, and he has very much extended his own business and his facilities for handling his share of it.

Death of W. F. Durfee.

William Franklin Durfee, well known to our readers as a contributor, chiefly of late years, upon ancient mechanical ways and devices, died November 14, sixty-five years old. Mr. Durfee was born at New Bedford, Mass., and had early mechanical training, after which he took a special course of study at the Lawrence Scientific School of Harvard University. In 1853, or before he was of age, he became an engineer and architect in his native town, and for five years served as city surveyor. He was in the State Legislature in 1861. During the civil war he designed a gun for naval use. In 1862 he went to Lake Superior to test the suitability of the ores of that region for the manufacture of steel by a process invented by William Kelly, and in connection with him produced several ingots of steel, from which, on May 25, 1865, were rolled the first steel rails produced in this country. Soon after that he established at Wyandotte, Mich., the first analytical laboratory as an adjunct to a steel works in the United States. In 1876 Mr. Durfee was one of the judges of machine tools for wood, iron and stone-working machinery at the Centennial Exposition in Philadelphia, where he received a medal. Later he built at Ansonia, Conn., the first successful furnaces for refining copper by the use of gaseous fuel, and in 1886 he became general manager of a company controling patents for the production

(*Continued on page 39.*)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 16.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

Punches & dies. Wal.M.Wks.,Waltham,Mass.

Rawhide, fibre and hard rubber gears. The Arthur Co. (See page 8.)

Construction and repair of Commutators, 50c. L. C. Sharp, Omaha, Neb.

For Sale—Castings for 4½ H.-P. gasoline engines. Puritan Mfg. Co., Portland, Me.

25 cents for copy of December 2, 1897, No. 48, volume 20. Address Box 11, AM. MACH.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas,Bridgeport,Ct. Send for index sheet.

Wanted, at Once—Work for 48 in. and 60 in. lathes. Builders Iron Foundry, Providence, R. I.

"Brandt's Triple Expansion Gaskets" are the best for boilers. Randolph Brandt, 38 Cortlandt st., New York.

Wanted—Partner for patenting invention; compressed air motor; also improved feed gearing for lathes. Address Box 10, A. MACH.

For Sale—Two geared Ferracute presses, 62 in. between uprights; little used, and in good condition. Address W. H. Mullins, Salem, Ohio.

Threads and gears; easy rules to cut any thread possible to be cut in the lathe, without algebra, sent to any address for 25c. by G. W. Dixon, Spring Lake, Mich.

For Sale—American Tool Co.'s screw machine, 18 in. swing, complete; used 6 months; will sell cheap or exchange for 24 in. lathe. Address Box 411, AMERICAN MACHINIST.

For Sale—One 20 horse-power horizontal tubular boiler, with pumps, inspirator, heaters, etc., and one Armington & Simms, 50 horse-power engine; all in first-class condition. Inquire Box 407, AMER. MACHINIST.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Manufacturers intending to introduce practical patented novelties of every description on the European market are requested to communicate with Adolf Heerdt, 15 Schillerstrasse, Frankfort-on-Maine, Germany, importer and general merchant. A1 references given and wanted.

A well-equipped machine shop and foundry, with ample water power, capacity 50 mechanics, tools suitable for engine building up to 24 x 24-inch or similar work, invites proposals in their line, or will consider manufacturing new specialties. Address P. O. Drawer 414, Lockport, N. Y.

An excellent chance for someone with a few thousand dollars to step into a modern machinery manufacturing plant, about one hour from New York city, that is making money; employing about 50 men; will be sold free of incumbrances and on easy terms; the owner wishing to retire on account of ill health. Address Box 420, AMER. MACHINIST.

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Purchasing agent will change position. Address Box 402, AMERICAN MACHINIST.

Traveling (machinery) salesman; first class. Address Box 401, AMER. MACHINIST.

Advertising manager; thorough in machine tools. Address Box 403, AMER. MACHINIST.

Experienced draftsman wants position; reliable man; well up in machine tools. Address Box 14, AMERICAN MACHINIST.

Mechanical draftsman wants situation; has experience in wood working and sawmill machinery. Address Box 17, AMER. MACHINIST.

Skilled toolmaker and draftsman wants change; 10 years tool making, 5 drafting; New England preferred. Box 13, AM. MACH.

Machinist wants position, shop testing and installing steam engines; can furnish best of reference. Address Box 19, AMER. MACHINIST.

Party with machine shop and drafting room, general supervision of details and management of labor, desires a situation. Box 1429, Boston, Mass.

Foundry foreman, who is at present engaged, but who wants to make a change. For particulars address Wm. H. Sickels, 254 Bond st., Elizabethport, N. J.

Wanted—Position as general foreman or superintendent; age 31; practical machinist and draftsman; expert on appliances for cheapening product. Box 22, AMER. MACH.

A thorough, practical machinist, 31, wants position as foreman; experience steam engine, electrical and general machine-shop work. Address Box 18, AMERICAN MACHINIST.

Foreman machinist on fine machine tools and general work, now holding that position with one of the largest tool builders in N. E., open for engagement January 1. Box 16, AMERICAN MACHINIST.

Position wanted as factory manager; familiar with most economical methods and practice in foundries, machine shops and kindred departments; thoroughly practical and up to date. Box 412, AMERICAN MACHINIST.

Now superintendent of shop manufacturing high-grade interchangeable machines of great variety; wish change climate; good education and references; thorough mechanic; well up in electrical work. Address Box 12, A. MACH

A mechanical engineer from the East, now resident in Chicago, making a specialty of economic production and the perfecting of manufacturing systems, would like to correspond with firms needing such service. Box 15, AMERICAN MACHINIST.

Position as cost clerk wanted by party having had 4 years' experience with large electrical machine shop; familiar with various systems, auditing of factory accounts, etc.; will accept small salary to demonstrate ability. Address Wm. Harvey, 39 Park st., Newark, N. J.

Help Wanted.

Draftsman—Wanted, first-class man on electric cranes. Address Box 20, AM. MACH.

Wanted—Foreman for tool department of electrical factory. Address Box 21, AM. MACH.

Wanted, at Once—Three capable men for general machine work. Greenwood Bros. & Co., So. Gardner, Mass.

Wanted—Experienced sealer and adjuster weighing scales; state positions held and wages. Address "Scale," AMER. MACHINIST.

Wanted—Experienced draftsman familiar with steam-engine work; give full particulars, age and experience. Address C., P. O. Box 2132, New York.

Wanted—General manager for foundry employing about 75 molders; must be experienced and up-to-date man. Address Box 415, AMERICAN MACHINIST.

Wanted—Experienced mechanical draftsman on electric generators and other electrical apparatus. Address, with full particulars, Stanley Electric Mfg. Co., Pittsfield, Mass.

Wanted—Two practical designers having had experience in designing shop tools and model work. Reply, addressing Box 416, AMERICAN MACHINIST, stating experience and wages expected.

Machinists wanted; a number of first-class men on high-speed marine engine work. Apply Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York City.

Wanted—A first-class foreman machine blacksmith, to take charge of forging department in large machine shop; state age, wages, nationality, experience and references. Box 419, AMERICAN MACHINIST.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from draftsmen, pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Wanted—Three good planer hands who can plane lathe and planer beds, etc.; also four good fitters on machine tools and two good draftsmen on machine tools; also lathe, planer and vise hands. Address Box 387, AMERICAN MACHINIST, and state wages wanted and experience.

Superintendent for large cycle works in England; must be a thorough mechanician and possess thorough knowledge of systematic cycle manufacturing and the handling of men; reply with full information as to former engagements and give references. Churchill, Leonard st., Finsbury, London.

Wanted—An experienced milling machine operator to take charge of milling department in one of the best machine-tool shops in the country; must understand all kinds of milling-machine and gear-cutter work and know how to produce first-class work rapidly; a splendid opportunity for the right man; married man preferred. Write to Box 418, AMERICAN MACHINIST, stating age, experience and salary expected.

Wanted—An A1 lathe hand, with experience in handling men, to take charge of about 25 engine lathes to get the greatest possible product from the machines; must have had experience in shops building high-grade machine tools; none but strictly first-class men who are looking for a steady position need apply; shop new and up to date. Address, stating age, experience and salary expected, Box 417, AMERICAN MACHINIST.

Positions Filled.

First-class Mechanical Engineers and Draftsmen
ARE ALWAYS IN DEMAND.

We can place you to your advantage.

Write us.
THE ENGINEERING AGENCY,
1604 Monadnock Block, Chicago, U. S. A.

Our Business is to Know

Whether a man is capable in his
PARTICULAR LINE of Engineering work.
We can refer reliable concerns to
THE MEN THEY WANT.
Write us.
THE ENGINEERING AGENCY,
1604 Monadnock Block, Chicago, U. S. A.

CLEVELAND GEAR WORKS,
W. R. SAWYER, Lessee.
88 SENECA STREET, CLEVELAND.

GEARS of all descriptions

30 DAYS' TRIAL

of the Cross Oil Filter will demonstrate that it reduces oil bills 50 per cent. or more. If it doesn't you may send it back at our expense. The trial is free.

Send for Catalog 16.

THE BURT MFG. CO.,
AKRON, OHIO, U.S.A.

Largest Manufacturers of Oil Filters in the World.

(*Continued from page 38.*)

of iron and steel castings. He had resided for several years past on Staten Island, N. Y., and a short time ago, suffering from acute melancholia, he was removed to the State Hospital at Middletown, N. Y., where he died, as above stated.

Mr. Durfee was a charter member of the American Society of Mechanical Engineers, was a manager of the society three years and vice-president two years, and a frequent and welcome participant in its discussions and contributor to its published proceedings. He was a member also of the Franklin Institute of Philadelphia and of the Iron and Steel Institute of Great Britain, before which body he read a paper in 1880. He was a man not only of wide practical experience, but of great research and erudition. He was the best living authority upon the rise and development of the modern steel industry of the world, and also upon matters pertaining to the history of invention and of the engineering profession. He was a collector of rare and curious books upon mechanical topics, and his library, we understand, is to go to the American Society of Mechanical Engineers, its most fitting permanent home. Mr. Durfee was a man of strong convictions, and outspoken in their expression; but he was a genial companion and a faithful friend, and an honest and upright citizen.

Obituary.

James P. Howatt, a master mechanic at the Brooklyn Navy Yard, died in Brooklyn November 16, fifty-five years old. He entered the Navy Yard soon after the close of the civil war.

Leonard Ames, head of the Ames Iron Works, and for fifty years one of the most prominent manufacturers of Northern New York, died at Oswego, N. Y., November 10, aged eighty-one years.

The funeral of Gen. T. W. Hyde, president of the Bath Iron Works, Bath, Me., which was held on November 18, was attended by the employees of the works, the veteran organizations and the business men of the city.

A report of the Naval Board of Inspection and Survey charged with a test of the Holland submarine boat, is favorable to the boat, and is to the effect that the craft meets all the requirements of the government. It is described as "an engine of warfare of terrible potency, which the government must necessarily adopt into its service."

The present active demand for mechanics led to some misunderstanding in Indianapolis recently, owing to the fact that Mr. J. H. Springer, who was formerly superintendent of the Niles Tool Works, was in Indianapolis hiring men to go to

Hamilton. He wanted especially molders, and succeeded in getting a number of them. His efforts in Indianapolis led to a report that there had been or was likely to be some labor difficulty in Hamilton, which report, however, had no foundation in fact.

Bicycle Factories Closed.

A press dispatch dated Toledo, Ohio, November 18, says: "The American Bicycle Company to-day closed the Viking and Colton factories and commenced dismantling the plants. The two concerns have employed 800 men, including the traveling and office forces, and these are now out of employment. In addition to these discharges the office force of the Lozier plant is let out. There are at present nearly 1,000 bicycle workers idle on account of these changes."

New Catalogs.

The Oster Manufacturing Company, Cleveland, sends us price list No. 10, giving price of stocks and dies, taps, screw plates and similar tools. The various tools are fully described and illustrated. The catalog is 4x6¾ inches.

Westinghouse Electric & Manufacturing Company, Pittsburgh, sends us catalog in which are illustrated and described standard types of Westinghouse railway motors. These motors are carefully described. The catalog contains also a number of illustrations of railway power stations equipped with Westinghouse motors. The catalog is standard sibe, 6x9 inches.

We have received from the Westinghouse Air-Brake Company, Pittsburgh, catalog in which is illustrated and described the Westinghouse electro-pneumatic system for controlling railway and other motors. The functions of this mechanism are described in full detail, and the catalog should be of interest to all engaged in the equipment and operation of electric railways. It is standard size, 6x9 inches.

We have received a copy of the handsomely printed catalog of Lundell generators put out by the Sprague Electric Company, of 20 Broad street, New York. The catalog goes into the technicalities of the subject sufficiently to explain the split-pole pieces, the chief object of which is to obtain a fixed position for the brushes without sparking under widely varying loads. The catalog contains 32 7x9¼-inch pages.

Baldwin Locomotive Works, Philadelphia, Pa., have issued No. 6 of the "Record of Recent Construction" series of publications, which contains fully illustrated descriptions of engines recently turned out by the company. The descriptive text is printed in French and English. The locomotives described in the catalog before us are intended for service in seven different countries. The catalog is standard size, 6x9 inches.

Manufacturers.

Jos. Dixon Crucible Company, Jersey City, is putting up a new building, 120 feet long, four stories high and 40 feet wide.

The Pinkney Mining Company, Pinkney, Tenn., has been recently incorporated, and it is the intention to erect a new iron plant.

(*Continued on page 41.*)

Famous for Temper and Cut.

NICHOLSON FILE CO.

When a different file is handed to a workman, he always asks, "Is it as good as the Nicholson?"

The Nicholson is the Standard of Quality.

NICHOLSON FILE CO.

NICHOLSON FILE COMPANY, - Providence, R. I., U.S.A.

LARGEST MAKERS IN THE WORLD. SAM'L M. NICHOLSON, PREST. AND GEN'L MGR.

CRANES

NORTHERN ENGINEERING WORKS, EAST ATWATER ST. DETROIT, MICHIGAN.

STEEL: A Manual for Steel-Users.

By WILLIAM METCALF. 12mo. Cloth, $2.00.

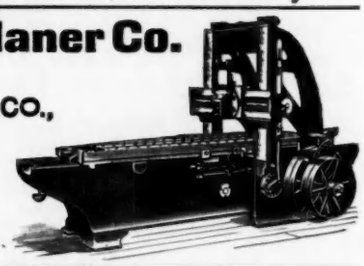
JOHN WILEY & SONS, 53 E. 10th St., New York City.

Woodward & Powell Planer Co.

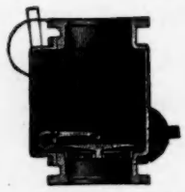
SUCCESSORS TO

THE POWELL PLANER CO.,

WORCESTER, MASS.



U. Baird Machinery Co., 125 Water St., Pittsburgh, Pa.
Robinson & Cary Co., St. Paul, Minn.
W. R. Colcord Mchy. Co., 502 North 2d St., St. Louis, Mo.
Parke & Lacy Co., Fremont St., San Francisco, Cal.
The Fairbanks Co., 705 Arch St., Philadelphia, Pa.



Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

Jenkins Brothers, New York, Boston, Philadelphia, Chicago.

Adjustable Tap Wrench

Will hold securely, taps up to 1-4 inch and drills up to 3-16 inch.

Machinists will find this a most useful tool. . . . .

Hammacher, Schlemmer & Co.

TOOLS FOR ALL TRADES.

209 Bowery, - - - - - - - - NEW YORK.

Genuine Lightning Screw Plates,

Taps, Dies, Reamers, Green River Screw Plates, Bolt Cutters, Drilling Machines, etc.

Send for Catalog.

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GREENFIELD, MASS., U.S.A.

Agts. in London, SELIG, SONNENTHAL & CO., 85 Queen Victoria St.